

Table of Contents

Volume I – Report

	Page
Preface	xxxvii
What Is this Document?.....	xxxvii
How Do I Use this Document?	xxxviii
What Has Changed?	xl
Summary of Changes.....	xl
Summary of Environmental Analysis Changes.....	xlii
Evaluation of Need for CEQA Recirculation or NEPA Supplement	xlii
What Happens Next?	xlili
Federal Approval	xlili
Fresno to Bakersfield HST Milestone Schedule.....	xlili
Fact Sheet	xlv
S.0 Summary	S-1
S.1 Introduction and Background	S-1
S.2 Tiered Environmental Review: Final Statewide Program EIR/EIS and Fresno to Bakersfield Section Project EIR/EIS	S-4
S.3 Issues Raised during Public Outreach	S-5
S.4 Summary of Changes Between Revised Draft EIR/ Supplemental Draft EIS and Final EIR/EIS	S-6
S.4.1 Summary of Project Changes	S-6
S.4.2 Summary of Environmental Analysis Changes.....	S-8
S.4.3 Evaluation of Need for CEQA Recirculation or NEPA Supplement	S-8
S.5 Purpose of and Need for the HST System and the Fresno to Bakersfield Section.....	S-9
S.5.1 Purpose of the HST System	S-9
S.5.2 Purpose of the Fresno to Bakersfield Section	S-9
S.5.3 Objectives for the HST System Statewide and within the Central San Joaquin Valley Region	S-9
S.5.4 Need for the HST System Statewide and within the South San Joaquin Valley Region	S-10
S.6 Alternatives.....	S-11
S.6.1 No Project Alternative.....	S-11
S.6.2 Fresno to Bakersfield Section High-Speed Train Alternatives	S-12
S.6.3 Station Area Development	S-13
S.6.4 Heavy Maintenance Facility.....	S-14
S.7 Design Considerations to Avoid and Minimize Impacts	S-15
S.8 No Project Alternative Impacts	S-15
S.9 HST Alternatives Evaluation.....	S-18
S.9.1 HST Benefits	S-20
S.9.2 Adverse Effects Common to All HST Alternatives.....	S-21
S.9.3 Comparison of HST Alignment Alternatives.....	S-31
S.9.4 Comparison of HST Stations.....	S-33
S.9.5 Comparison of HMF Alternative Sites	S-34
S.9.6 Capital Cost.....	S-34
S.9.7 Section 4(f)/Section 6(f)	S-34
Section 4(f)	S-34
Section 6(f)	S-35
S.10 Areas of Controversy	S-35

S.11	Draft EIR/EIS and Revised Draft EIR/Supplemental Draft EIS Circulation and Review.....	S-35
S.12	Public and Agency Comment Summary	S-36
S.13	Identification of Preferred Alternative.....	S-37
S.14	Next Steps in the Environmental Process.....	S-38
S.14.1	FRA Decision-Making.....	S-38
S.14.2	U.S. Army Corps of Engineers Decision-Making.....	S-39
S.14.3	Surface Transportation Board	S-39
S.14.4	California High-Speed Rail Authority Decision-Making.....	S-39
S.14.5	Project Implementation.....	S-40
1.0	Project Purpose, Need, and Objectives	1-1
1.1	Introduction	1-1
1.1.1	The High-Speed Train System.....	1-1
1.1.2	The Fresno to Bakersfield HST Project.....	1-1
1.1.3	The HST Environmental Review Process	1-1
1.1.4	Lead Agencies, Cooperating Agencies, Responsible Agencies, and Surface Transportation Board Jurisdiction	1-3
1.1.5	Consistency with Federal Transportation Policy.....	1-5
1.2	Purpose of and Need for the HST System and the Fresno to Bakersfield HST Section	1-5
1.2.1	Purpose of HST System.....	1-5
1.2.2	Purpose of Fresno to Bakersfield HST Project.....	1-6
1.2.3	CEQA Project Objectives of the HST System in California and in the South San Joaquin Valley.....	1-6
1.2.4	Statewide and Regional Need for the HST System in the Fresno to Bakersfield Section	1-7
1.2.4.1	Travel Demand and Capacity Constraints	1-9
1.2.4.2	Safety and Reliability.....	1-20
1.2.4.3	Modal Connections.....	1-21
1.2.4.4	Air Quality and greenhouse gas emissions.....	1-21
1.2.4.5	Protection and Preservation of Natural Resources and Agricultural Lands	1-23
1.3	Relationship to Other Agency Plans, Policies, and Programs.....	1-24
1.3.1	San Joaquin Valley Blueprint.....	1-24
1.3.2	San Joaquin Corridor Strategic Plan and Corridor Service Plan	1-25
1.3.3	2011 Fresno Forward Regional Transportation Plan	1-26
1.3.4	Kings County Association of Governments 2011 Regional Transportation Plan.....	1-26
1.3.5	Tulare County Association of Governments 2011 Transportation Plan ...	1-27
1.3.6	Kern Council of Governments Regional Transportation Plan	1-27
1.3.7	Fresno-Yosemite International Airport Master Plan.....	1-28
1.3.8	Meadows Field Airport Master Plan.....	1-28
1.4	Relationship to Other Transportation Projects in the Study Area	1-29
1.4.1	State Route 99 Corridor Business Plan.....	1-29
1.4.2	California State Rail Plan, 2007–08 to 2017–18 and 2013	1-29
1.4.3	Fresno County Measure C Extension.....	1-30
1.4.4	Bakersfield Thomas Roads Improvement Program	1-30
1.5	Tiering of Program EIR/EIS Documents.....	1-31
1.6	Revised 2012 Business Plan and 2014 Business Plan	1-33
1.6.1	Summary of Phased Implementation Strategy in 2012 and 2014 Business Plans	1-35
1.6.2	Relationship of Business Plans to Fresno to Bakersfield EIR/EIS	1-37

2.0	Alternatives	2-1
2.1	Background	2-1
2.1.1	California HST Project Background	2-1
2.1.2	Fresno to Bakersfield Section EIR/EIS Background	2-3
2.2	HST System Performance Criteria, Infrastructure, and Systems	2-3
2.2.1	System Design Performance, Safety, and Security.....	2-4
2.2.2	Vehicles	2-5
2.2.3	Stations	2-6
2.2.3.1	Station Platforms and Trackway (Station Box).....	2-8
2.2.3.2	Station Arrival/Departure Facility (Station House).....	2-8
2.2.4	Infrastructure Components	2-8
2.2.4.1	At-Grade Profile	2-9
2.2.4.2	Retained-Fill Profile	2-10
2.2.4.3	Retained-Cut Profile	2-10
2.2.4.4	Elevated Profile	2-10
2.2.5	Grade Separations	2-11
2.2.6	Traction Power Distribution.....	2-12
2.2.6.1	Traction Power Substations	2-12
2.2.6.2	Switching and Paralleling Stations.....	2-14
2.2.6.3	Backup and Emergency Power Supply Sources for Stations and Facilities	2-14
2.2.6.4	Signaling and Train-Control Elements.....	2-15
2.2.7	Track Structure.....	2-15
2.2.8	Maintenance Facilities.....	2-15
2.2.8.1	Maintenance-of-Way Facilities	2-15
2.2.8.2	HST Heavy Maintenance Facility	2-16
2.2.8.3	Operations Control Center.....	2-18
2.3	Potential Alternatives Considered during Alternatives Screening Process.....	2-18
2.3.1	HST Project-Level Alternatives Development Process.....	2-18
2.3.2	Range of Potential Alternatives Considered and Findings	2-19
2.3.2.1	Fresno Subsection	2-21
2.3.2.2	Rural Subsection	2-24
2.3.2.3	Bakersfield Subsection	2-30
2.3.2.4	Heavy Maintenance Facility	2-32
2.3.3	Summary of Design Features for Alternatives Being Carried Forward	2-34
2.4	Alignment, Station, and Heavy Maintenance Facility Alternatives Evaluated in this Project EIR/EIS.....	2-37
2.4.1	No Project Alternative – Existing and Planned Improvements.....	2-37
2.4.1.1	Planned growth.....	2-37
2.4.1.2	Highway Element	2-41
2.4.1.3	Aviation Element	2-50
2.4.1.4	Intercity Transit Element.....	2-51
2.4.1.5	Freight Rail Element	2-53
2.4.2	BNSF Alternative.....	2-54
2.4.2.1	Alignment Requirements.....	2-54
2.4.2.2	BNSF Adjacency	2-61
2.4.2.3	North-south alignment.....	2-61
2.4.3	Alignment Alternatives.....	2-67
2.4.3.1	Hanford West Bypass 1 Alternative	2-67
2.4.3.2	Hanford West Bypass 1 Modified Alternative	2-68
2.4.3.3	Hanford West Bypass 2 Alternative	2-68
2.4.3.4	Hanford West Bypass 2 Modified Alternative	2-69

2.4.3.5	Corcoran Elevated Alternative	2-69
2.4.3.6	Corcoran Bypass Alternative.....	2-70
2.4.3.7	Allensworth Bypass Alternative.....	2-70
2.4.3.8	Wasco-Shafter Bypass Alternative.....	2-71
2.4.3.9	Bakersfield South Alternative	2-71
2.4.3.10	Bakersfield Hybrid Alternative	2-72
2.4.4	Station Alternatives.....	2-72
2.4.4.1	Fresno Station	2-73
2.4.4.2	Kings/Tulare Regional Station Alternatives.....	2-78
2.4.4.3	Bakersfield Station Alternatives	2-79
2.4.5	Modification of Caltrans/State Facilities.....	2-88
2.4.5.1	State Route Reconfigurations	2-91
2.4.5.2	State Highway Underpasses.....	2-92
2.4.5.3	Roadway Overcrossings.....	2-92
2.4.5.4	Eliminating Leg of Intersections.....	2-92
2.4.5.5	Ramp Modifications	2-92
2.4.6	Proposed Heavy-Maintenance Facility Locations.....	2-92
2.4.6.1	Fresno Works–Fresno HMF Site	2-93
2.4.6.2	Kings County–Hanford HMF Site	2-93
2.4.6.3	Kern Council of Governments–Wasco HMF Site	2-93
2.4.6.4	Kern Council of Governments–Shafter East HMF Site	2-93
2.4.6.5	Kern Council of Governments–Shafter West HMF Site.....	2-95
2.5	Travel Demand and Ridership Forecasts	2-101
2.5.1	Ridership and HST System Design.....	2-102
2.5.2	Ridership and Environmental Impact Analysis.....	2-102
2.5.3	Ridership and Station Area Parking.....	2-103
2.6	Operations and Service Plan.....	2-103
2.6.1	HST Service	2-103
2.6.2	Maintenance Activities.....	2-106
2.7	Additional High-Speed Train Development Considerations.....	2-107
2.7.1	High-Speed Train, Land Use Patterns, and Development around High-Speed Train Stations	2-107
2.8	Construction Plan and Phased Implementation Strategy	2-113
2.8.1	General Approach	2-114
2.8.2	Pre-Construction Activities	2-116
2.8.3	Major Construction Activities.....	2-117
2.8.3.1	Earthwork	2-117
2.8.3.2	Bridge, Aerial Structure, and Road Crossing Construction	2-118
2.8.3.3	Railroad Systems Construction	2-118
2.8.3.4	Station Construction.....	2-119
2.9	Permits and Approvals	2-120
3.0	Affected Environment, Environmental Consequences, and Mitigation Measures.....	3.1-1
3.1	Introduction.....	3.1-1
3.1.1	Chapter 3 Purpose and Content	3.1-2
3.1.2	Organization of This Chapter	3.1-2
3.1.3	Approach to the Analysis	3.1-3
3.1.4	Legal Authority to Implement Offsite Mitigation.....	3.1-7
3.1.5	Summary of Changes Between Revised Draft EIR/Supplemental Draft EIS and Final EIR/EIS	3.1-7

3.2	Transportation	3.2-1
3.2.1	Introduction	3.2-1
3.2.2	Laws, Regulations, and Orders	3.2-1
3.2.2.1	Federal	3.2-1
3.2.2.2	State	3.2-1
3.2.2.3	Regional and Local	3.2-2
3.2.3	Methods for Evaluating Impacts	3.2-4
3.2.3.1	Traffic Operation Standards	3.2-4
3.2.3.2	Baseline Operational Analysis	3.2-6
3.2.3.3	Operational/Project Impacts	3.2-8
3.2.3.4	Methods for Evaluating Impacts under NEPA	3.2-9
3.2.3.5	CEQA Significance Criteria	3.2-10
3.2.3.6	Study Area for Analysis	3.2-11
3.2.4	Affected Environment	3.2-11
3.2.4.1	Regional Transportation System	3.2-12
3.2.4.2	Fresno Station Area	3.2-19
3.2.4.3	Kings/Tulare Regional Station—East Alternative	3.2-32
3.2.4.4	Kings/Tulare Regional Station—West Alternative	3.2-37
3.2.4.5	Bakersfield Station Area	3.2-43
3.2.4.6	Heavy Maintenance Facility Alternatives	3.2-51
3.2.5	Environmental Consequences	3.2-52
3.2.5.1	Overview	3.2-52
3.2.5.2	No Project Alternative	3.2-63
3.2.5.3	High-Speed Train Alternatives	3.2-66
3.2.6	Project Design Features	3.2-121
3.2.7	Mitigation Measures	3.2-124
3.2.7.1	Mitigation Measures for Potential Permanent Road Closures	3.2-125
3.2.7.2	Mitigation Measures for Intersection and Roadway Impacts	3.2-126
3.2.7.3	Mitigation Measures for Intersection and Roadway Impacts Around Heavy Maintenance Facility Sites	3.2-138
3.2.7.4	Mitigation Measures for Intersection and Roadway Impacts Around The City of Corcoran	3.2-141
3.2.8	NEPA Impact Summary	3.2-141
3.2.9	CEQA Significance Conclusions	3.2-142
3.3	Air Quality and Global Climate Change	3.3-1
3.3.1	Introduction	3.3-1
3.3.2	Laws, Regulations, and Orders	3.3-1
3.3.2.1	Federal	3.3-1
3.3.2.2	State	3.3-6
3.3.2.3	Regional and Local	3.3-8
3.3.3	Pollutants for Analysis	3.3-10
3.3.3.1	Criteria Pollutants	3.3-10
3.3.3.2	Toxic Air Contaminants	3.3-12
3.3.3.3	Greenhouse Gases	3.3-13
3.3.4	Methods for Evaluating Impacts	3.3-13
3.3.4.1	Study Areas for Analysis	3.3-14
3.3.4.2	Statewide and Regional Emission Calculations	3.3-16
3.3.4.3	Local Operational Emission Sources at HST Stations	3.3-16
3.3.4.4	Microscale CO Analysis	3.3-18
3.3.4.5	Particulate Matter Hot Spot	3.3-21
3.3.4.6	Mobile Source Air Toxics Analysis	3.3-21

3.3.4.7	Asbestos	3.3-24
3.3.4.8	Greenhouse Gas Analysis	3.3-24
3.3.4.9	HMF and MOWF Operations Impact Analysis	3.3-25
3.3.4.10	Construction Phase Analysis	3.3-29
3.3.4.11	Significance Thresholds	3.3-33
3.3.5	Affected Environment	3.3-36
3.3.5.1	Local Meteorological Conditions	3.3-36
3.3.5.2	Local Monitored Air Quality Data	3.3-37
3.3.5.3	Attainment Status of Study Area	3.3-43
3.3.5.4	Air Quality Plans and Programs	3.3-44
3.3.6	Environmental Consequences	3.3-45
3.3.6.1	Overview	3.3-45
3.3.6.2	No Project Alternative	3.3-46
3.3.6.3	High-Speed Train Alternatives	3.3-46
3.3.7	Compliance with Conformity Rules	3.3-84
3.3.7.1	General Conformity	3.3-84
3.3.7.2	Transportation Conformity	3.3-85
3.3.8	Project Design Features	3.3-85
3.3.9	Mitigation Measures	3.3-86
3.3.9.1	CEQA and NEPA Level of Impact after Mitigation/Impacts Summary	3.3-91
3.3.10	NEPA Impacts Summary	3.3-92
3.3.10.1	Construction Period Impacts	3.3-92
3.3.10.2	Project/Operational Phase Impacts	3.3-93
3.3.11	CEQA Significance Conclusions	3.3-93
3.4	Noise and Vibration	3.4-1
3.4.1	Introduction	3.4-1
3.4.2	Laws, Regulations, and Orders	3.4-1
3.4.2.1	Federal	3.4-1
3.4.2.2	State	3.4-2
3.4.2.3	Regional and Local	3.4-2
3.4.3	Methods for Evaluating Impacts	3.4-2
3.4.3.1	What is Noise?	3.4-3
3.4.3.2	What Is Vibration?	3.4-4
3.4.3.3	Impact Assessment Guidance	3.4-5
3.4.3.4	Methods for Evaluating Effects under NEPA	3.4-15
3.4.3.5	CEQA Significance Criteria	3.4-16
3.4.3.6	Study Area for Analysis	3.4-16
3.4.4	Affected Environment	3.4-18
3.4.4.1	Existing Noise Levels	3.4-18
3.4.4.2	Existing Vibration Levels	3.4-27
3.4.5	Environmental Consequences	3.4-28
3.4.5.1	Overview of Project Impacts	3.4-28
3.4.5.2	No Project Alternative	3.4-31
3.4.5.3	High-Speed Train Alternatives	3.4-31
3.4.6	Project Design Features	3.4-55
3.4.7	Mitigation Measures	3.4-55
3.4.7.1	Construction Period	3.4-56
3.4.7.2	Project	3.4-57
3.4.8	NEPA Impacts Summary	3.4-77
3.4.9	CEQA Significance Conclusions	3.4-78

3.5	Electromagnetic Fields and Electromagnetic Interference	3.5-1
3.5.1	Introduction	3.5-1
3.5.2	Laws, Regulations, and Orders	3.5-3
3.5.2.1	Introduction.....	3.5-3
3.5.2.2	Federal.....	3.5-5
3.5.2.3	State.....	3.5-6
3.5.2.4	Regional and Local	3.5-6
3.5.3	Methods for Evaluating Impacts	3.5-6
3.5.3.1	Electromagnetic Fields and Electromagnetic Interference Data Collection and Analysis	3.5-6
3.5.3.2	Methods for Evaluating effects under NEPA	3.5-7
3.5.3.3	CEQA Significance Criteria.....	3.5-8
3.5.3.4	Study Area for Analysis.....	3.5-8
3.5.4	Affected Environment	3.5-9
3.5.4.1	Sources of EMF, EMI, and RFI	3.5-9
3.5.4.2	Local Conditions.....	3.5-9
3.5.4.3	Receivers Susceptible to EMF/EMI/RFI Effects.....	3.5-12
3.5.4.4	Railroad/Transportation Equipment Susceptible to EMF/EMI/RFI Effects from Airports, Military, or Other Commercial Transmitters along the Right-of-Way.....	3.5-13
3.5.5	Environmental Consequences.....	3.5-13
3.5.5.1	Overview	3.5-13
3.5.5.2	No Project Alternative.....	3.5-14
3.5.5.3	High-Speed Train Alternatives	3.5-14
3.5.6	Project Design Features.....	3.5-21
3.5.7	Mitigation Measures	3.5-21
3.5.8	NEPA Impacts Summary.....	3.5-22
3.5.9	CEQA Significance Conclusion	3.5-23
3.6	Public Utilities and Energy	3.6-1
3.6.1	Introduction	3.6-1
3.6.2	Laws, Regulations, and Orders	3.6-1
3.6.2.1	Federal.....	3.6-1
3.6.2.2	State.....	3.6-2
3.6.2.3	Regional and Local	3.6-4
3.6.3	Methods of Evaluation of Impacts.....	3.6-11
3.6.3.1	Public Utilities and Energy Data Collection and Analysis ..	3.6-11
3.6.3.2	Methods for Evaluating Effects under NEPA	3.6-14
3.6.3.3	CEQA Significance Criteria.....	3.6-15
3.6.3.4	Study Area	3.6-16
3.6.4	Affected Environment	3.6-16
3.6.4.1	Public Utilities	3.6-16
3.6.4.2	ENERGY	3.6-33
3.6.5	Environmental Consequences.....	3.6-37
3.6.5.1	Overview.....	3.6-37
3.6.5.2	No Project Alternative.....	3.6-44
3.6.5.3	High-Speed Train Alternatives	3.6-44
3.6.6	Project Design Features.....	3.6-77
3.6.7	Mitigation Measures	3.6-78
3.6.8	NEPA Impacts Summary.....	3.6-78
3.6.8.1	Summary of Impacts	3.6-78
3.6.8.2	Significance Under NEPA.....	3.6-79
3.6.9	CEQA Significance Conclusions.....	3.6-79

3.7	Biological Resources and Wetlands	3.7-1
3.7.1	Introduction	3.7-1
3.7.1.1	Key Definitions.....	3.7-2
3.7.2	Laws, Regulations, and Orders.....	3.7-5
3.7.2.1	Federal	3.7-5
3.7.2.2	State.....	3.7-8
3.7.2.3	Regional and Local.....	3.7-9
3.7.2.4	Habitat Conservation Plans in the Project Vicinity.....	3.7-9
3.7.3	Methods for Evaluating Impacts	3.7-10
3.7.3.1	Study Areas.....	3.7-10
3.7.3.2	Literature Review.....	3.7-12
3.7.3.3	Field Surveys	3.7-14
3.7.3.4	Methods for Evaluating Impacts	3.7-17
3.7.3.5	Methods for Evaluating Effects under NEPA	3.7-20
3.7.3.6	CEQA Significance Criteria.....	3.7-20
3.7.4	Affected Environment.....	3.7-21
3.7.4.1	Regional Setting	3.7-21
3.7.4.2	Plant Communities and Land Cover Types	3.7-23
3.7.4.3	Native Fauna Assemblage	3.7-27
3.7.4.4	Special-Status Species	3.7-28
3.7.4.5	Habitats of Concern.....	3.7-32
3.7.4.6	Wildlife Movement Corridors	3.7-44
3.7.5	Environmental Consequences	3.7-49
3.7.5.1	Overview.....	3.7-49
3.7.5.2	No Project Alternative.....	3.7-49
3.7.5.3	High-Speed Train Alternatives	3.7-50
3.7.6	Project Design Features	3.7-170
3.7.7	Mitigation Measures	3.7-170
3.7.7.1	Common Mitigation Measures for Biological Resources ..	3.7-173
3.7.7.2	Construction Period Mitigation Measures	3.7-180
3.7.7.3	Project Mitigation Measures	3.7-195
3.7.7.4	Compensatory Mitigation Options	3.7-204
3.7.7.5	Impacts Resulting from Implementation of Mitigation Measures	3.7-213
3.7.8	NEPA Impacts Summary.....	3.7-225
3.7.9	CEQA Significance Conclusions.....	3.7-232
3.8	Hydrology and Water Resources	3.8-1
3.8.1	Introduction	3.8-1
3.8.2	Laws, Regulations, and Orders.....	3.8-1
3.8.2.1	Federal	3.8-1
3.8.2.2	State.....	3.8-3
3.8.2.3	Regional and Local.....	3.8-5
3.8.3	Methods for Evaluating Impacts	3.8-10
3.8.3.1	Methods for Analyzing Study Area Impacts.....	3.8-11
3.8.3.2	Methods for Evaluating Effects under NEPA	3.8-13
3.8.3.3	CEQA Significance Criteria.....	3.8-14
3.8.3.4	Study Area For Analysis	3.8-15
3.8.4	Affected Environment.....	3.8-17
3.8.4.1	Climate, Precipitation, and Topography	3.8-17
3.8.4.2	Regional Hydrology and Water Quality	3.8-17
3.8.4.3	Hydrology and Water Quality in the Study Area	3.8-30
3.8.5	Environmental Consequences	3.8-41
3.8.5.1	Overview.....	3.8-41

3.8.5.2	No Project Alternative	3.8-42
3.8.5.3	High-Speed Train Alternatives	3.8-42
3.8.6	Project Design Features	3.8-71
3.8.7	NEPA Impact Summary	3.8-75
3.8.7.1	Summary of Impacts	3.8-75
3.8.7.2	Significance under NEPA	3.8-75
3.8.8	CEQA Significance Conclusions	3.8-76
3.9	Geology, Soils, and Seismicity	3.9-1
3.9.1	Introduction	3.9-1
3.9.2	Laws, Regulations, and Orders	3.9-2
3.9.2.1	State	3.9-2
3.9.2.2	Regional and Local	3.9-3
3.9.3	Methods for Evaluating Impacts	3.9-6
3.9.3.1	Methods for Evaluating Effects under NEPA	3.9-7
3.9.3.2	CEQA Significance Criteria	3.9-7
3.9.3.3	Study Area for Analysis	3.9-8
3.9.4	Affected Environment	3.9-10
3.9.4.1	Physiography and Regional Geologic Setting	3.9-10
3.9.4.2	Geology Along the Proposed High-Speed Train Alternatives	3.9-10
3.9.4.3	Site Soils	3.9-12
3.9.4.4	Geologic Hazards	3.9-16
3.9.4.5	Primary Seismic Hazards	3.9-16
3.9.4.6	Secondary Seismic Hazards	3.9-19
3.9.4.7	Areas of Difficult Excavation	3.9-24
3.9.4.8	Mineral and Energy Resources	3.9-24
3.9.4.9	Affected Environment By HST Alternative	3.9-26
3.9.5	Environmental Consequences	3.9-26
3.9.5.1	Overview	3.9-26
3.9.5.2	No Project Alternative	3.9-27
3.9.5.3	High-Speed Train Alternatives	3.9-28
3.9.6	Project Design Features	3.9-38
3.9.7	NEPA Impact Summary	3.9-41
3.9.8	CEQA Significance Conclusions	3.9-42
3.10	Hazardous Materials and Wastes	3.10-1
3.10.1	Introduction	3.10-1
3.10.2	Laws, Regulations, and Orders	3.10-1
3.10.2.1	Federal	3.10-1
3.10.2.2	State	3.10-3
3.10.2.3	Local Jurisdiction Plans and Policies	3.10-4
3.10.3	Methods for Evaluating Impacts	3.10-6
3.10.3.1	Methods for Evaluating Effects under NEPA	3.10-7
3.10.3.2	CEQA Significance Criteria	3.10-7
3.10.3.3	Study Area for Analysis	3.10-8
3.10.4	Affected Environment	3.10-8
3.10.4.1	General Areas of Concern	3.10-9
3.10.4.2	Specific Sites of Concern	3.10-14
3.10.5	Environmental Consequences	3.10-28
3.10.5.1	Overview	3.10-28
3.10.5.2	No Project Alternative	3.10-29
3.10.5.3	High-Speed Train Alternatives	3.10-29
3.10.6	Project Design Features	3.10-37
3.10.7	Mitigation Measures	3.10-38

3.10.8	NEPA Impacts Summary.....	3.10-38
3.10.9	CEQA Significance Conclusions.....	3.10-40
3.11	Safety and Security	3.11-1
3.11.1	Introduction	3.11-1
3.11.2	Regulatory Requirements	3.11-3
3.11.2.1	Federal	3.11-3
3.11.2.2	State.....	3.11-4
3.11.2.3	Regional and Local.....	3.11-5
3.11.2.4	Other Requirements	3.11-6
3.11.3	Methods of Evaluation of Impacts	3.11-6
3.11.3.1	Methods for Evaluating Effects under NEPA	3.11-6
3.11.3.2	CEQA Significance Criteria.....	3.11-7
3.11.3.3	Study Area	3.11-8
3.11.4	Affected Environment.....	3.11-8
3.11.4.1	Emergency Services	3.11-8
3.11.4.2	Community Safety.....	3.11-17
3.11.5	Environmental Consequences	3.11-24
3.11.5.1	Overview.....	3.11-25
3.11.5.2	No Project Alternative.....	3.11-25
3.11.5.3	High-Speed Train Alternatives	3.11-26
3.11.6	Project Design Features	3.11-43
3.11.7	Mitigation Measures	3.11-45
3.11.8	NEPA Impacts Summary.....	3.11-46
3.11.9	CEQA Significance Conclusions.....	3.11-47
3.12	Socioeconomics, Communities, and Environmental Justice	3.12-1
3.12.1	Introduction	3.12-1
3.12.2	Laws, Regulations, and Orders: Socioeconomics and Communities	3.12-2
3.12.2.1	Federal	3.12-2
3.12.2.2	State.....	3.12-2
3.12.2.3	Regional and Local.....	3.12-3
3.12.3	Laws, Regulations, and Orders: Environmental Justice	3.12-4
3.12.3.1	Federal	3.12-4
3.12.3.2	State.....	3.12-5
3.12.4	Methods for Evaluating Impacts: Socioeconomics and Communities	3.12-5
3.12.4.1	Data Collection and Analysis	3.12-5
3.12.4.2	Methods for Evaluating Effects under NEPA	3.12-9
3.12.4.3	CEQA Significance Criteria.....	3.12-10
3.12.4.4	Study Area for Analysis.....	3.12-10
3.12.5	Methods for Evaluating Impacts: Environmental Justice	3.12-13
3.12.5.1	Environmental Justice Outreach and Interest Groups ...	3.12-14
3.12.6	Affected Environment: Socioeconomics and Communities.....	3.12-16
3.12.6.1	Population Characteristics	3.12-17
3.12.6.2	Housing Setting	3.12-27
3.12.6.3	Economic Setting	3.12-32
3.12.6.4	Communities and Neighborhoods	3.12-36
3.12.7	Affected Environment: Environmental Justice	3.12-42
3.12.8	Environmental Consequences: Socioeconomics and Communities.....	3.12-49
3.12.8.1	No Project Alternative.....	3.12-51
3.12.8.2	High-Speed Train Alternatives	3.12-52
3.12.9	Environmental Consequences: Environmental Justice	3.12-107
3.12.9.1	No Project Alternative.....	3.12-107

3.12.9.2 High-Speed Train Alternatives	3.12-107
3.12.10 Project Design Features.....	3.12-135
3.12.11 Mitigation Measures: Socioeconomics and Communities	3.12-138
3.12.12 Mitigation Measures: Environmental Justice.....	3.12-141
3.12.13 NEPA Impacts Summary: Socioeconomics and Communities	3.12-142
3.12.13.1 Construction Period Impacts.....	3.12-142
3.12.13.2 Project Impacts.....	3.12-143
3.12.14 NEPA Impacts Summary: Environmental Justice	3.12-144
3.12.14.1 Construction Period Impacts.....	3.12-144
3.12.14.2 Project Impacts.....	3.12-144
3.12.15 CEQA Significance Conclusions	3.12-145
3.13 Station Planning, Land Use, and Development	3.13-1
3.13.1 Introduction	3.13-1
3.13.2 Laws, Regulations, and Orders.....	3.13-2
3.13.2.1 Federal.....	3.13-2
3.13.2.2 State.....	3.13-2
3.13.2.3 Regional and local	3.13-3
3.13.2.4 Consistency with Local and Regional Plans	3.13-13
3.13.3 Methods for Evaluating Impacts	3.13-16
3.13.3.1 Methods for Evaluating Effects under NEPA	3.13-17
3.13.3.2 CEQA Significance Criteria.....	3.13-17
3.13.3.3 Study Area	3.13-18
3.13.4 Affected Environment.....	3.13-18
3.13.4.1 BNSF Alternative	3.13-18
3.13.4.2 Other Alignment Alternatives.....	3.13-19
3.13.4.3 HST Station Area.....	3.13-21
3.13.4.4 Heavy Maintenance Facility Alternatives	3.13-33
3.13.4.5 Planned Development.....	3.13-33
3.13.5 Environmental Consequences.....	3.13-34
3.13.5.1 Overview.....	3.13-34
3.13.5.2 No Project Alternative.....	3.13-35
3.13.5.3 High-Speed Train Alternatives	3.13-35
3.13.6 Project Design Features.....	3.13-59
3.13.7 Mitigation Measures	3.13-60
3.13.8 NEPA Impacts Summary.....	3.13-61
3.13.9 CEQA Significance Conclusion	3.13-62
3.14 Agricultural Lands.....	3.14-1
3.14.1 Introduction	3.14-1
3.14.2 Laws, Regulations, and Orders.....	3.14-1
3.14.2.1 Federal.....	3.14-1
3.14.2.2 State.....	3.14-2
3.14.2.3 Regional and Local	3.14-4
3.14.3 Methods for Evaluating Impacts	3.14-9
3.14.3.1 Methods for Evaluating Effects under NEPA	3.14-10
3.14.3.2 CEQA Significance Criteria.....	3.14-11
3.14.3.3 Study Area for Analysis.....	3.14-11
3.14.4 Affected Environment.....	3.14-12
3.14.4.1 Regional Agriculture	3.14-12
3.14.4.2 Important and Protected Farmlands.....	3.14-14
3.14.4.3 Agricultural Lands Along the Proposed HST Alternatives.....	3.14-32
3.14.5 Environmental Consequences.....	3.14-34
3.14.5.1 Overview.....	3.14-34
3.14.5.2 No Project Alternative.....	3.14-40

3.14.5.3	High-Speed Train Alternatives	3.14-41
3.14.6	Project Design Features	3.14-60
3.14.7	Mitigation Measure	3.14-62
3.14.8	NEPA Impact Summary	3.14-63
3.14.9	CEQA Significance Conclusions.....	3.14-64
3.15	Parks, Recreation, and Open Space	3.15-1
3.15.1	Introduction	3.15-1
3.15.2	Laws, Regulations, and Orders.....	3.15-1
3.15.2.1	Federal	3.15-1
3.15.2.2	State.....	3.15-3
3.15.2.3	Regional and Local.....	3.15-3
3.15.3	Methods for Evaluating Impacts	3.15-4
3.15.3.1	Methods for Evaluating Effects Under NEPA.....	3.15-5
3.15.3.2	CEQA Significance Criteria.....	3.15-6
3.15.3.3	Study Area for Analysis.....	3.15-6
3.15.4	Affected Environment.....	3.15-7
3.15.4.1	BNSF Alternative	3.15-19
3.15.4.2	Hanford West Bypass 1 and 2 Alternatives	3.15-21
3.15.4.3	Hanford West Bypass 1 and Bypass 2 Modified Alternatives	3.15-21
3.15.4.4	Kings/Tulare Regional Station–West Alternative	3.15-22
3.15.4.5	Corcoran Elevated Alternative	3.15-22
3.15.4.6	Corcoran Bypass Alternative.....	3.15-22
3.15.4.7	Allensworth Bypass Alternative.....	3.15-22
3.15.4.8	Wasco-Shafter Bypass Alternative.....	3.15-23
3.15.4.9	Bakersfield South Alternative	3.15-23
3.15.4.10	Bakersfield Hybrid Alternative	3.15-24
3.15.4.11	Heavy Maintenance Facility Site Alternatives.....	3.15-24
3.15.5	Environmental Consequences	3.15-25
3.15.5.1	Overview of Project Impacts	3.15-25
3.15.5.2	No Project Alternative.....	3.15-25
3.15.5.3	High-Speed Train Alternatives	3.15-26
3.15.6	Project Design Features	3.15-47
3.15.7	Mitigation Measures	3.15-48
3.15.7.1	Construction Period	3.15-48
3.15.7.2	Project Period	3.15-48
3.15.8	NEPA Impacts Summary.....	3.15-49
3.15.9	CEQA Significance Conclusions.....	3.15-51
3.16	Aesthetics and Visual Resources	3.16-1
3.16.1	Introduction	3.16-1
3.16.2	Laws, Regulations, and Orders.....	3.16-1
3.16.2.1	Federal	3.16-1
3.16.2.2	State.....	3.16-2
3.16.2.3	Local and Regional.....	3.16-2
3.16.3	Methods for Evaluating Impacts	3.16-6
3.16.3.1	Method for Evaluating Effects under NEPA	3.16-9
3.16.3.2	CEQA Significance Criteria.....	3.16-10
3.16.3.3	Study Area	3.16-10
3.16.4	Affected Environment.....	3.16-11
3.16.4.1	Fresno to Bakersfield Section Visual Resources	3.16-11
3.16.4.2	Landscape Units, Key Viewpoints, and Establishing Existing Visual Quality Categories	3.16-12
3.16.5	Environmental Consequences	3.16-59

3.16.5.1	Overview	3.16-59
3.16.5.2	No Project Alternative	3.16-60
3.16.5.3	High-Speed Train Alternatives	3.16-61
3.16.6	Project Design Features	3.16-140
3.16.7	Mitigation Measures	3.16-140
3.16.7.1	Construction Period	3.16-141
3.16.7.2	Project	3.16-142
3.16.8	NEPA Impacts Summary	3.16-145
3.16.9	CEQA Significance Conclusions	3.16-146
3.17	Cultural and Paleontological Resources	3.17-1
3.17.1	Introduction	3.17-1
3.17.1.1	Status of the NHPA Section 106 Compliance Process	3.17-2
3.17.2	Laws, Regulations, and Orders	3.17-3
3.17.2.1	Federal	3.17-3
3.17.2.2	State	3.17-6
3.17.2.3	Regional and Local	3.17-8
3.17.3	Methods for Evaluating Effects/Impacts	3.17-11
3.17.3.1	Cultural and Paleontological Resource Data Sources	3.17-14
3.17.3.2	Agency, Native American, and Public Outreach	3.17-21
3.17.3.3	Methods for Evaluating Impacts under NEPA	3.17-43
3.17.3.4	Methods for Evaluating Impacts under CEQA	3.17-44
3.17.4	Affected Environment	3.17-45
3.17.4.1	Archaeological Resources	3.17-45
3.17.4.2	Historic Archaeological Resources	3.17-47
3.17.4.3	Historic Architectural Resources	3.17-57
3.17.4.4	Paleontological Resources	3.17-94
3.17.5	Environmental Consequences	3.17-101
3.17.5.1	Overview	3.17-101
3.17.5.2	No Project Alternative	3.17-102
3.17.5.3	Construction Period Impacts	3.17-102
3.17.5.4	Project Impacts	3.17-127
3.17.6	Mitigation Measures	3.17-128
3.17.6.1	Archaeological Resources	3.17-129
3.17.6.2	Historic Architectural Resources	3.17-132
3.17.6.3	Paleontological Resources	3.17-136
3.17.7	NEPA Impact Summary	3.17-136
3.17.7.1	Cultural Resources	3.17-136
3.17.7.2	Paleontological Resources	3.17-137
3.17.8	CEQA Significance Conclusions	3.17-138
3.18	Regional Growth	3.18-1
3.18.1	Introduction	3.18-1
3.18.2	Laws, Regulations, and Orders	3.18-2
3.18.2.1	Federal	3.18-2
3.18.2.2	State	3.18-2
3.18.2.3	Regional and Local	3.18-4
3.18.2.4	Local	3.18-6
3.18.3	Methods for Evaluating Impacts	3.18-10
3.18.3.1	Regional Modeling	3.18-10
3.18.3.2	Study Area	3.18-11
3.18.4	Affected Environment	3.18-12
3.18.4.1	Population	3.18-12
3.18.4.2	Employment	3.18-15
3.18.4.3	Unemployment Rates	3.18-15

3.18.4.4	Housing Demand	3.18-18
3.18.5	Environmental Consequences	3.18-19
3.18.5.1	Overview	3.18-19
3.18.5.2	No Project Alternative	3.18-20
3.18.5.3	High-Speed Train Alternatives	3.18-20
3.18.6	Summary	3.18-37
3.19	Cumulative Impacts	3.19-1
3.19.1	Laws, Regulations, and Orders	3.19-1
3.19.1.1	National Environmental Policy Act	3.19-1
3.19.2	Methods	3.19-2
3.19.3	Cumulative Projects and Growth Forecasts	3.19-3
3.19.3.1	Historical Context of Project Area	3.19-3
3.19.3.2	Projected Growth Trends	3.19-4
3.19.3.3	Cumulative Project List	3.19-5
3.19.4	Analysis of Cumulative Impacts	3.19-5
3.19.4.1	Cumulative Condition	3.19-5
3.19.4.2	High-Speed Train Alternatives Contributions	3.19-6
4.0	Section 4(f)/6(f) Evaluation	4-1
4.1	Introduction	4-1
4.1.1	Law, Regulations and Orders	4-2
4.1.1.1	Federal	4-2
4.1.2	Study Area	4-3
4.1.2.1	Public Park and Recreation Lands, Open Space, and Wildlife and Waterfowl Refuges	4-3
4.1.2.2	Historic Properties	4-3
4.1.3	Section 4(f) Applicability	4-5
4.1.4	Section 4(f) Use Definition	4-6
4.1.4.1	Permanent Use	4-6
4.1.4.2	Temporary Occupancy	4-6
4.1.4.3	Constructive Use	4-6
4.1.4.4	De minimis Impact	4-7
4.2	Coordination	4-7
4.3	Purpose and Need	4-8
4.4	Alternatives	4-8
4.4.1	No Project Alternative	4-8
4.4.2	BNSF Alternative	4-9
4.4.3	Hanford West Bypass 1 Alternative	4-9
4.4.4	Hanford West Bypass 1 Modified Alternative	4-10
4.4.5	Hanford West Bypass 2 Alternative	4-10
4.4.6	Hanford West Bypass 2 Modified Alternative	4-11
4.4.7	Corcoran Elevated Alternative	4-11
4.4.8	Corcoran Bypass Alternative	4-11
4.4.9	Allensworth Bypass Alternative	4-11
4.4.10	Wasco-Shafter Bypass Alternative	4-11
4.4.11	Bakersfield South Alternative	4-12
4.4.12	Bakersfield Hybrid Alternative	4-12
4.4.13	Heavy Maintenance Facility Site Alternatives	4-12
4.5	Section 4(f) Applicability Analysis	4-13
4.5.1	Parks, Recreation, Open Space, and Wildlife and Waterfowl Refuges	4-13
4.5.2	Cultural Resources	4-25

4.6	Section 4(f) Use Assessment	4-33
4.6.1	Park, Recreation, and Wildlife Refuge Resources.....	4-33
4.6.1.1	Father Stephen Wyatt Park Use Assessment	4-33
4.6.1.2	Colonel Allensworth State Historic Park/Allensworth Historic District	4-33
4.6.1.3	Allensworth Ecological Reserve Use Assessment.....	4-34
4.6.1.4	McMurtrey Aquatic Center Use Assessment.....	4-37
4.6.1.5	Kern River Parkway Use Assessment	4-38
4.6.1.6	Mill Creek Linear Park Use Assessment	4-39
4.6.1.7	Amtrak Station Playground.....	4-41
4.6.2	Cultural Resources	4-41
4.7	Avoidance Alternatives	4-47
4.7.1	Individual Resource Avoidance Assessments.....	4-49
4.7.1.1	Washington Irrigated Colony Historic Rural Landscape, Washington Colony Canal and North Branch of Oleander Canal	4-49
4.7.1.2	Last Chance Ditch	4-52
4.7.1.3	9860 13th Avenue	4-52
4.7.1.4	Peoples Ditch.....	4-53
4.7.1.5	Colonel Allensworth State Historic Park/Allensworth Historic District	4-53
4.7.1.6	Allensworth Ecological Reserve	4-53
4.7.1.7	Kern River Parkway	4-53
4.7.1.8	Mill Creek Linear Park	4-54
4.7.1.9	2509 East California Avenue	4-55
4.8	Measures to Minimize Harm.....	4-55
4.9	Section 4(f) Least Harm Analysis.....	4-62
4.9.1	Least Harm Analysis for Hanford Area Alternatives	4-63
4.9.2	Least Harm Analysis for Bakersfield Area Alternatives.....	4-71
4.9.3	Net Harm to Section 4(f) Property	4-77
4.9.4	Impacts to Environmental Resources Outside of Section 4(f) Uses	4-77
4.10	Section 6(f).....	4-78
4.10.1.1	Converted area: Description	4-79
4.10.1.2	Section 6(f) Summary.....	4-80
5.0	Project Costs and Operations.....	5-1
5.1	Introduction	5-1
5.2	Capital Costs	5-1
5.2.1	High-Speed Train Alternatives	5-2
5.2.2	Heavy Maintenance Facility	5-11
5.3	Operation and Maintenance (O&M) Costs	5-11
5.3.1	Operating Speeds	5-12
5.3.2	Travel Times	5-12
5.3.3	Development of Operation and Maintenance (O&M) Costs	5-12
6.0	Other CEQA/NEPA Considerations	6-1
6.1	Unavoidable Adverse Potentially Significant Impacts	6-1
6.2	Relationship between Short-Term Use of the Environment and the Enhancement of Long-Term Productivity	6-3
6.3	Significant Irreversible Environmental Changes That Would Result from the Proposed Project If Implemented.....	6-3

7.0	Preferred Alternative and Stations	7-1
7.1	Summary of Comments	7-3
7.1.1	California Legislators	7-4
7.1.2	Project Area Local Governments	7-4
7.1.3	Federal Agencies	7-5
7.1.4	Tribal Consultation	7-5
7.1.5	State Agencies	7-5
7.1.6	Regional and Other Public Agencies	7-5
7.1.7	Businesses	7-5
7.1.8	Organizations	7-6
7.1.9	Individuals	7-6
7.2	Alternatives Considered	7-6
7.3	Preferred Alternative	7-7
7.3.1	Fresno Station Alternative	7-11
7.3.2	Hanford and Corcoran Alternatives with Kings/Tulare Regional Station	7-11
7.3.3	Allensworth Alternative	7-12
7.3.4	Wasco to Shafter Area Alternatives	7-13
7.3.5	Bakersfield Alternatives with Bakersfield Station	7-14
7.4	Environmentally Superior Alternative	7-16
7.5	Environmentally Preferable Alternative	7-16
7.6	Least Environmentally Damaging Practicable Alternative	7-16
8.0	Public and Agency Involvement	8-1
8.1	Environmental Justice Outreach	8-2
8.2	Public and Agency Scoping	8-4
8.2.1	Notices of Preparation, Notices of Intent, and Public Information Materials	8-4
8.2.2	Scoping Meetings	8-4
8.2.3	Scoping Comments	8-5
8.3	Alternatives Analysis Process	8-6
8.3.1	Public Information Meetings and Materials during the Alternatives Analysis Process	8-8
8.3.2	Technical Working Group Meetings during the Alternatives Analysis Process	8-9
8.3.3	Environmental Resource Agency Meetings during the Alternatives Analysis Process	8-9
8.4	Development of the Draft EIR/EIS	8-10
8.4.1	Public Information Materials and Meetings	8-10
8.4.2	Technical Working Group Meetings	8-10
8.4.3	Agency Meetings and Consultation	8-10
8.5	Notification and Circulation of the Draft EIR/EIS	8-12
8.6	Publication and Review of the Draft EIR/EIS	8-13
8.6.1	Public and Agency Information Meetings and Hearings	8-13
8.6.2	Comments on the Draft EIR/EIS	8-14
8.7	Development of the Revised DEIR/Supplemental DEIS	8-14
8.7.1	Public Information Materials and Meetings	8-14
8.7.2	Technical Working Group Meetings	8-15
8.7.3	Agency Meetings and Consultation	8-15
8.8	Notification and Circulation of the Revised DEIR/Supplemental DEIS	8-16
8.9	Publication and Review of the Revised DEIR/Supplemental DEIS	8-17
8.9.1	Public and Agency Information Meetings and Hearings	8-17
8.9.2	Comments on the Revised DEIR/Supplemental DEIS	8-18
8.9.3	Ongoing Outreach Leading Up to Publication of the Final EIR/EIS	8-18

9.0	EIR/EIS Distribution	9-1
9.1	Repository Locations.....	9-1
9.2	Federal Agencies	9-5
9.3	State Agencies	9-6
9.4	Elected Officials.....	9-8
9.5	Regional/Local Agencies.....	9-12
9.6	Organizations and Businesses.....	9-13
9.7	Native American Contacts.....	9-14
9.8	Schools and Districts.....	9-15
10.0	List of Preparers	10-1
10.1	California High-Speed Rail Authority	10-1
10.2	Federal Railroad Administration	10-2
10.3	List of Consultants	10-2
11.0	References/Sources Used in Document Preparation.....	11-1
S.0	Executive Summary	11-1
Chapter 1.0	Project Purpose, Need, and Objectives	11-2
Chapter 2.0	Alternatives.....	11-6
Section 3.1	Introduction	11-10
Section 3.2	Transportation	11-10
Section 3.3	Air Quality and Global Climate	11-13
Section 3.4	Noise and Vibration	11-20
Section 3.5	Electromagnetic Fields and Electromagnetic Interference	11-20
Section 3.6	Public Utilities and Energy	11-22
Section 3.7	Biological Resources and Wetlands.....	11-29
Section 3.8	Hydrology and Water Resources	11-37
Section 3.9	Geology, Soils, and Seismicity.....	11-42
Section 3.10	Hazardous Materials and Wastes.....	11-45
Section 3.11	Safety and Security.....	11-47
Section 3.12	Socioeconomics, Communities, and Environmental Justice	11-53
Section 3.13	Station Planning, Land Use, and Development	11-58
Section 3.14	Agricultural Lands.....	11-61
Section 3.15	Parks, Recreation, and Open Space.....	11-64
Section 3.16	Aesthetics and Visual Resources	11-65
Section 3.17	Cultural and Paleontological Resources.....	11-67
Section 3.18	Regional Growth.....	11-73
Section 3.19	Cumulative Impacts.....	11-76
Chapter 4.0	Section 4(f)/Section 6(f) Eval	11-78
Chapter 5.0	Project Costs and Operations	11-78
Chapter 6.0	Other NEPA/CEQA Considerations.....	11-79
Chapter 7.0	Preferred Alternative and Stations	11-79
Chapter 8.0	Public and Agency Involvement.....	11-80
Chapter 9.0	EIR/EIS Distribution	11-81
Chapter 10.0	List of Preparers	11-81
Chapter 12.0	Glossary of Terms.....	11-82
	Program Wide Standards and Guidance	11-82
12.0	Glossary of Terms.....	12-1
13.0	Index	13-1
14.0	Acronyms and Abbreviations	14-1

Volume II – Technical Appendices

1-A	Business Plans
2-A	Road Crossings
2-B	Railroad Crossings
2-C	Operations and Service Plan Summary
2-D	Applicable Design Standards
2-E	Summary of Requirements for Operations and Maintenance Facilities
2-F	Potential Interim Service on the Initial Construction Segment
3.1-A	Parcels within HST Footprint (bound separately)
3.3-A	Potential Impact from Induced Winds
3.3-B	Draft Federal General Conformity Determination
3.4-A	Noise and Vibration
3.5-A	Technical Study: Pre-Construction Electromagnetic Measurement Survey of 10 Locations along the Fresno to Bakersfield Section
3.6-A	Existing Plus Project Conditions Energy Analysis
3.6-B	Water Usage Analysis Technical Memorandum
3.6-C	Energy Analysis Memorandum
3.7-A	Special-Status Species and Observed Habitats
3.7-B	Comparison of Impacts on Biological Resources by Alternative
3.7-C	Watershed Evaluation Report
3.8-A	Water Bodies Crossed by Project Alternatives
3.8-B	Summary of Hydraulic Modeling for Project Alternatives
3.11-A	Safety and Security Data
3.11-B	Airport Obstructions
3.12-A	Relocation Assistance Program Brochures
3.12-B	Effects on School District Funding and Transportation Bus Routes
3.12-C	Children's Health and Safety Risk Assessment
3.13-A	Land Use Plans, Goals, and Policies
3.14-A	Results and Findings of Land Evaluation and Site Assessment Pursuant to the Farmland Protection Policy Act
3.14-B	High-Speed Train Effects on Confined Animal Agriculture
3.14-C	High-Speed Train Noise Disturbance on Grazing Lands
3.17-A	Section 106 Programmatic Agreement
3.19-A	Planned and Potential Projects and Plans
3.19-B	Planned and Potential Transportation Projects
5-A	HST Operating and Maintenance Cost for Use in EIR/EIS Project-Level Analyses

Volume III – Alignments and Other Plans

Section A	– Alignment Plans, Part 1 of 2
Section B	– Alignment Plans, Part 2 of 2
Section C	– Roadway Plans, Part 1 of 2
Section D	– Roadway Plans, Part 2 of 2
Section E	– Station Plans
Section F	– HST Structure Plans, Part 1 of 2
Section G	– HST Structure Plans, Part 2 of 2
Section H	– Roadway Structure Plans
Section I	– Sound Barrier Plans

Volume IV – Response to Comments (Draft EIR/EIS)

Part 1 of 3:	Chapters 15.0–20.0 and 21.0 (A-Q)
Part 2 of 3:	Chapter 21.0 (R)

Part 3 of 3: Chapters 21.0 (S-Z) and 22.0–33.0

Volume V – Response to Comments (Revised DEIR/Supplemental DEIS)

Part 1 of 4: Chapters 34.0–38.0 and 39.0 (A-J)

Part 2 of 4: Chapter 39.0 (K-Z)

Part 3 of 4: Chapter 40.0

Part 4 of 4: Chapters 41.0–52.0

Tables

Table S-1 Design Features of Alternatives Carried Forward.....	S-19
Table S-2 Comparison of Impacts of HST Alignment Alternatives Page 1A	S-42
Table S-3 HST Mitigation Measures	S-66
Table S-4 Environmental Impacts Differentiating HMF Alternatives.....	S-94
Table 1-1 Population Growth in California, the San Joaquin Valley, and the Counties of the South San Joaquin Valley	1-10
Table 1-2 Unemployment and Income in California and the Counties of the South San Joaquin Valley.....	1-11
Table 1-3 Current and Projected Vehicle Miles Traveled in the South San Joaquin Valley.....	1-14
Table 1-4 Travel Growth for Intercity Highways.....	1-15
Table 1-5 Commercial Air Traffic and Central Valley Airports.....	1-17
Table 1-6 Estimated Total Travel Times (Door-to-Door in Hours and Minutes) between City Pairs by Auto, Air, and Rail (Peak Conditions)	1-19
Table 2-1 HST Performance Criteria	2-4
Table 2-2 Rural Subsection Initial Alternatives.....	2-25
Table 2-3 Design Features of Alternatives Carried Forward.....	2-36
Table 2-4 Regional Projected Population and Employment	2-38
Table 2-5 Planned Residential Development Projects Within the Fresno to Bakersfield Area as of March 2010.....	2-39
Table 2-6 Increase in Total Daily Vehicle Miles Traveled.....	2-41
Table 2-7 No Project Alternative – Planned Improvements in Fresno County.....	2-43
Table 2-8 No Project Alternative – Planned Improvements in Kings County.....	2-44
Table 2-9 No Project Alternative – Planned Improvements in Tulare County	2-44
Table 2-10 No Project Alternative – Planned Improvements in Kern County.....	2-45
Table 2-11 Passenger Boardings for Fresno, Visalia, and Bakersfield Airports.....	2-50
Table 2-12 Programmed Improvements in 2008 California State Rail Plan	2-52
Table 2-13 Planning and Design Assumptions	2-73
Table 2-14 Impact of HST Alternatives on Caltrans State Facilities	2-88
Table 2-15 Fresno to Bakersfield Section HMF Site Descriptions	2-95
Table 2-16 HST System Ridership Forecasts (in millions per year)	2-101
Table 2-17 Approximate Construction Schedule	2-115
Table 2-18 Major Environmental Permits and Approvals.....	2-120
Table 3.2-1 Regional and Local Plans and Policies	3.2-2
Table 3.2-2 Roadway Segment Level of Service	3.2-5
Table 3.2-3 Level of Service and Average Vehicular Delay Definitions for Signalized Intersections.....	3.2-5
Table 3.2-4 Level of Service and Average Vehicular Delay Definition for Unsignalized Intersections.....	3.2-6
Table 3.2-5 Year 2035 Forecast Vehicle Trip Generation at HST Stations.....	3.2-8
Table 3.2-6 Intersections Operating at LOS E or F near the Proposed Fresno Station	3.2-20
Table 3.2-7 City of Fresno Bus Routes and Weekday Service Frequency.....	3.2-31
Table 3.2-8 Intersections Operating at LOS E or F near the Kings/Tulare Regional Station—East Alternative (Potential).....	3.2-37

Table 3.2-9 Intersections Operating at LOS E or F near the Kings/Tulare Regional Station—West Alternative (Potential)	3.2-38
Table 3.2-10 Intersections Operating at LOS D, E or F near the Proposed Bakersfield Station	3.2-49
Table 3.2-11 Proposed Bakersfield HST Station Bus Routes and Weekday Service Frequency	3.2-50
Table 3.2-12 Intersections Operating at LOS E or F around the Proposed HMF Locations under Existing Conditions.....	3.2-51
Table 3.2-13 Vehicle Miles Traveled.....	3.2-74
Table 3.2-14 Existing Plus Project Roadway Segment Analysis Downtown Fresno Station	3.2-83
Table 3.2-15 Future (2035) Plus Project Roadway Segment Analysis Downtown Fresno Station	3.2-84
Table 3.2-16 Existing Plus Project, Intersection Operating Conditions Downtown Fresno Station	3.2-86
Table 3.2-17 Future (2035) with Project, Intersection Operating Conditions Downtown Fresno Station	3.2-88
Table 3.2-18 Existing Plus Project, Roadway Segment Analysis, Kings/Tulare Regional Station—East Alternative.....	3.2-94
Table 3.2-19 Existing Plus Project, Intersection Analysis, Kings/Tulare Regional Station—East Alternative	3.2-95
Table 3.2-20 Future (2035) Plus Project, Intersection Operating Conditions, Kings/Tulare Regional Station—East Alternative	3.2-95
Table 3.2-21 Existing Plus Project, Intersection Analysis, Kings/Tulare Regional Station—West Alternative	3.2-97
Table 3.2-22 Future (2035) with Project, Intersection Operating Conditions, Kings/Tulare Regional Station—West Alternative	3.2-98
Table 3.2-23 Existing Plus Project, Roadway Segment Analysis, Bakersfield Station—North and Bakersfield—South Alternatives	3.2-100
Table 3.2-24 Future (2035) Plus Project, Roadway Segment Analysis, Bakersfield Station—North and Bakersfield—South Alternatives	3.2-101
Table 3.2-25 Existing Plus Project, Roadway Segment Analysis, Bakersfield Station—Hybrid.....	3.2-102
Table 3.2-26 Future (2035) Plus Project, Roadway Segment Analysis, Bakersfield Station— Hybrid.....	3.2-103
Table 3.2-27 Existing Plus Project, Intersection Operating Conditions, Bakersfield Station—North and Bakersfield—South Alternatives	3.2-107
Table 3.2-28 Future (2035) with Project, Intersection Operating Conditions, Bakersfield Station—North and Bakersfield—South Alternatives	3.2-109
Table 3.2-29 Existing Plus Project, Intersection Operating Conditions, Bakersfield Hybrid Station	3.2-111
Table 3.2-30 Future (2035) with Project, Intersection Operating Conditions, Bakersfield Hybrid Station.....	3.2-112
Table 3.2-31 HMF Roadway Segment Analysis (Existing Plus Project)	3.2-115
Table 3.2-32 HMF Roadway Segment Analysis (Future [2035] Plus Project)	3.2-116
Table 3.2-33 HMF Intersection Analysis (Existing Plus Project).....	3.2-117
Table 3.2-34 HMF Intersection Analysis (Future [2035] Plus Project).....	3.2-117
Table 3.2-35 Existing Plus Project Roadway Segments Level-of-Service Summary Analysis for Corcoran.....	3.2-118
Table 3.2-36 Future Plus Project Roadway Segments Level-of-Service Summary Analysis for Corcoran	3.2-119
Table 3.2-37 Existing Plus Project Intersection Operating Conditions — Corcoran Study Intersections	3.2-120

Table 3.2-38 Future (2035) Plus Project Intersection Operating Conditions — Corcoran Study Intersections	3.2-120
Table 3.2-39 Existing Plus Project Mitigation Measures – Fresno Station Area.....	3.2-127
Table 3.2-40 Future (2035) Plus Project Mitigation Measures – Fresno Station Area	3.2-128
Table 3.2-41 Existing Plus Project Mitigation Measures – Kings/Tulare Regional Station– East Alternative.....	3.2-131
Table 3.2-42 Future (2035) Plus Project Mitigation Measures – Kings/Tulare Regional Station–East Alternative	3.2-132
Table 3.2-43 Existing Plus Project Mitigation Measures – Kings/Tulare Regional Station– West Alternative.....	3.2-133
Table 3.2-44 Future (2035) Plus Project Mitigation Measures – Kings/Tulare Regional Station–West Alternative.....	3.2-134
Table 3.2-45 Existing Plus Project Mitigation Measures – Bakersfield Stations.....	3.2-135
Table 3.2-46 Future (2035) Plus Project Mitigation Measures – Bakersfield Stations	3.2-136
Table 3.2-47 Existing Plus Project Mitigation Measures – Fresno Heavy Maintenance Facility Site	3.2-138
Table 3.2-48 Future (2035) Plus Project Mitigation Measures – Fresno Heavy Maintenance Facility Site.....	3.2-138
Table 3.2-49 Existing Plus Project Mitigation Measures – Hanford Heavy Maintenance Facility Site	3.2-139
Table 3.2-50 Future (2035) Plus Project Mitigation Measures – Hanford Heavy Maintenance Facility Site.....	3.2-139
Table 3.2-51 Existing Plus Project and Future (2035) Plus Project Mitigation Measures - Wasco Heavy Maintenance Facility Site	3.2-140
Table 3.2-52 Future (2035) Plus Project Mitigation Measures - Shafter Heavy Maintenance Facility Site.....	3.2-140
Table 3.2-53 Future (2035) Plus Project Mitigation Measures – City of Corcoran	3.2-141
Table 3.2-54 Summary of Potential Impacts on Transportation Resources.....	3.2-143
Table 3.3-1 State and Federal Ambient Air Quality Standards.....	3.3-3
Table 3.3-2 General Conformity Thresholds	3.3-34
Table 3.3-3 SJVAPCD CEQA Construction and Operational Thresholds of Significance.....	3.3-36
Table 3.3-4 Ambient Criteria Pollutant Concentration Data at Air Quality Monitoring Stations Closest to the Project	3.3-39
Table 3.3-4 Ambient Criteria Pollutant Concentration Data at Air Quality Monitoring Stations Closest to the Project	3.3-41
Table 3.3-5 Federal and State Attainment Status	3.3-43
Table 3.3-6 Planning Documents Relevant to Project's Study Area	3.3-44
Table 3.3-7 BNSF Alternative At-Grade and Elevated Alignment Construction Emissions for Years 2014–2023 ^a (tons/year)	3.3-48
Table 3.3-8 HST Alternative CO ₂ e Construction Emissions (metric tons/ year).....	3.3-54
Table 3.3-9 Summary of Estimated 2035 Statewide Emission Burden Changes (Project versus No Project -2035) (tons/year)	3.3-58
Table 3.3-10 Summary of Estimated 2009 Statewide Emission Burden Changes (Existing Plus Project versus Existing Conditions–2009) (tons/year).....	3.3-59
Table 3.3-11 Summary of Regional Changes in Operational Emissions in (Project versus No Project 2035) (tons/year)	3.3-60
Table 3.3-12 Summary of Regional Changes in Operational Emissions (Existing Plus Project versus Existing Condition 2009) (tons/year).....	3.3-61
Table 3.3-13 2035 Estimated Statewide GHG Emissions (Project versus No Project) (MMT/year)	3.3-65
Table 3.3-14 2009 Estimated Statewide GHG Emission Changes (Existing Plus Project versus Existing Conditions) (MMT/year).....	3.3-65

Table 3.3-15 2035 On-Road Vehicles Regional GHG Emissions (Project versus No Project) (MMT/year)	3.3-66
Table 3.3-16 2009 On-Road Vehicles Regional GHG Emissions (Existing Plus Project versus Existing Condition) (MMT/year)	3.3-67
Table 3.3-17 2035 Project Alternatives Regional GHG Emissions (Project Versus No Project) (MMT/year)	3.3-68
Table 3.3-18 2009 Project Alternatives Regional GHG Emissions(Existing Plus Project versus Existing Condition) (MMT/year)	3.3-68
Table 3.3-19 Maximum Modeled CO Concentrations at Intersections near the Fresno, Kings/Tulare Regional, and Bakersfield HST Stations and HMF Sites	3.3-74
Table 3.3-20 Maximum Modeled 2035 CO Concentrations at Fresno, Kings/Tulare Regional, and Bakersfield Parking Facilities	3.3-77
Table 3.3-21 Summary of Significant Air Quality and Global Climate Change Impacts and Mitigation Measures	3.3-94
Table 3.4-1 Federal Transit Administration Construction Noise Assessment Criteria	3.4-6
Table 3.4-2 Construction Vibration Damage Criteria	3.4-7
Table 3.4-3 Federal Railroad Administration Noise-Sensitive Land Uses	3.4-7
Table 3.4-4 Federal Highway Administration Traffic Noise Abatement Criteria	3.4-9
Table 3.4-5 Interim Criteria for High-Speed Train Noise Effects on Animals	3.4-10
Table 3.4-6 FRA Ground-Borne Vibration and Ground-Borne Noise Impact Criteria	3.4-11
Table 3.4-7 FRA Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for Special Buildings	3.4-12
Table 3.4-8 Screening Distances for High-Speed Rail Speed Regime III	3.4-17
Table 3.4-9 FRA Screening Distances for Vibration Assessment	3.4-18
Table 3.4-10 Summary of Noise Impacts by Project Alternative from High-Speed Train Operations	3.4-28
Table 3.4-11 Sensitive Noise Receivers Surrounding Heavy Maintenance Facility Sites	3.4-30
Table 3.4-12 Typical Equipment Noise for Rail Construction	3.4-32
Table 3.4-13 Approximate Distances to Vibration Criterion-Level Contours – Construction	3.4-33
Table 3.4-14 Noise Impacts and Sensitive Noise Receivers along the BNSF Alternative	3.4-35
Table 3.4-15 Noise Impacts for the Hanford West Bypass 1 Alternative – At-Grade	3.4-41
Table 3.4-16 Noise Impacts for the Hanford West Bypass 1 Alternative Modified – Below-Grade	3.4-41
Table 3.4-17 Noise Impacts for Hanford West Bypass 2 Alternative – At-Grade	3.4-42
Table 3.4-18 Noise Impacts for Hanford West Bypass 2 Alternative Modified – Below-Grade	3.4-43
Table 3.4-19 Sensitive Noise Receivers along the Corcoran Elevated Alternative	3.4-43
Table 3.4-20 Sensitive Noise Receivers along the Corcoran Bypass Alternative	3.4-43
Table 3.4-21 Sensitive Noise Receivers along the Allensworth Bypass Alternative	3.4-44
Table 3.4-22 Sensitive Noise Receivers along the Wasco-Shafter Bypass Alternative	3.4-44
Table 3.4-23 Sensitive Noise Receivers along the Bakersfield South Alternative	3.4-45
Table 3.4-24 Sensitive Noise Receivers along the Bakersfield Hybrid Alternative	3.4-45
Table 3.4-25 Impacts on Schools by Alternative	3.4-46
Table 3.4-26 Screening Distances for Noise Effects on Wildlife and Domestic Animals	3.4-52
Table 3.4-27 Approximate Distances to Vibration Criterion Level Contours	3.4-53
Table 3.4-28 Sensitive Vibration Receivers along the BNSF Alternative	3.4-53
Table 3.4-29 Potential Sound Barrier Mitigation for Operational Noise for BNSF Alternative	3.4-60
Table 3.4-30 Potential Mitigation for Operational Noise for Corcoran Elevated	3.4-62
Table 3.4-31 Potential Mitigation for Operational Wasco-Shafter Bypass	3.4-62
Table 3.4-32 Potential Mitigation for Operational Noise for Bakersfield South	3.4-63
Table 3.4-33 Potential Mitigation for Operational Noise for Bakersfield Hybrid	3.4-64

Table 3.4-34	Potential Vibration Mitigation Procedures and Descriptions	3.4-76
Table 3.4-35	Summary of Potential Impacts from Noise and Vibration	3.4-79
Table 3.5-1	IEEE C95.6 Magnetic Field MPE Levels for the General Public.....	3.5-3
Table 3.5-2	IEEE C95.6 Electric Field MPE Levels for the General Public	3.5-4
Table 3.5-3	RF Emissions Safety Levels Expressed as MPEs	3.5-5
Table 3.5-4	Summary Comparison of Measured and Calculated 60-Hz Magnetic Fields	3.5-11
Table 3.5-5	Expected Worst-Case 60-Hz Magnetic Fields Based on Closest Distances to Sensitive Receptors from the Centerline for Two HST Alternative Alignments.....	3.5-12
Table 3.5-6	Summary of HST EMF Modeling Results.....	3.5-15
Table 3.5-7	Length of High-Speed Train Alternative Alignments At-Grade and Adjacent to Existing Rail Lines.....	3.5-20
Table 3.5-8	Length of Tracks Associated with Alternative HMF Sites Adjacent to Existing Rail Lines.....	3.5-20
Table 3.5-9	Summary of Potentially Significant EMF/EMI Impacts and Mitigation Measures.....	3.5-24
Table 3.6-1	Local Plans and Policies.....	3.6-5
Table 3.6-2	Construction Energy Consumption Assumptions for the Fresno to Bakersfield Section	3.6-14
Table 3.6-3	Study Area Utility and Energy Providers	3.6-17
Table 3.6-4	Water Suppliers in the Fresno to Bakersfield Study Area.....	3.6-21
Table 3.6-5	Wastewater Treatment Plant Existing Average Flow and Capacity Summary for Proposed HST Station and Maintenance Facility Locations in the Fresno to Bakersfield Section	3.6-25
Table 3.6-6	Number of Storm Drain Facility Conflicts within Study Area.....	3.6-28
Table 3.6-7	Landfill Facility Summary for Fresno County	3.6-31
Table 3.6-8	Landfill Facility Summary for Tulare County.....	3.6-32
Table 3.6-9	Landfill Facility Summary for Kern County	3.6-33
Table 3.6-10	2009 Electricity Consumption in Fresno, Kings, Tulare, and Kern Counties	3.6-35
Table 3.6-11	Fuel Sources for Electric Power in California in 2005	3.6-35
Table 3.6-12	2035 Estimated Change in Energy Consumption due to the HST System (50% to 83% Fare Scenario).....	3.6-43
Table 3.6-13	Construction Water Use Summary.....	3.6-45
Table 3.6-14	Alternative Alignment Impacts: High-Risk Utilities.....	3.6-51
Table 3.6-15	Alternative Alignment Impacts: Low-Risk Utilities.....	3.6-52
Table 3.6-16	Estimated Existing Water Use and Anticipated Project Water Demand at Proposed High-Speed Train Stations for the Fresno to Bakersfield Section.....	3.6-62
Table 3.6-17	Estimated Project Wastewater (Sewage) Generated for Each High-Speed Train Station.....	3.6-66
Table 3.6-18	Analysis of High-Speed Train System Energy Use	3.6-73
Table 3.6-19	On-Road Vehicle Energy Changes for Counties within the Fresno to Bakersfield Section	3.6-75
Table 3.6-20	Analysis of Energy Effects from Reduction of Number of Airplane Flights Statewide	3.6-76
Table 3.6-21	Summary of Potentially Significant Utility Impacts and Mitigation Measures ..	3.6-80
Table 3.7-1	Federal Laws and Regulations.....	3.7-5
Table 3.7-2	State Laws and Regulations.....	3.7-8
Table 3.7-3	Special-Status Plant Species with Potential to Occur in the Special-Status Plant Study Area	3.7-28
Table 3.7-4	Special-Status Wildlife Species with Potential to Occur in the Habitat Study Area.....	3.7-30
Table 3.7-5	Special-Status Species Included in Recovery Plans.....	3.7-40
Table 3.7-6	Communities Potentially Affected by the Alternative Alignments (acres): Construction Period Impacts (Temporary Impacts).....	3.7-52

Table 3.7-7 Comparison of Construction Period Impacts on Jurisdictional Waters by Alternative.....	3.7-82
Table 3.7-8 Summary of Aquatic Resource Impacts on Jurisdictional Waters by Relative Condition	3.7-83
Table 3.7-9 Communities Potentially Affected by the Alternative Alignments (acres): Project Impacts ^a (Permanent Impacts).....	3.7-104
Table 3.7-10 Communities Potentially Affected by the Heavy Maintenance Facility Alternatives (acres): Project (Permanent Impacts)	3.7-111
Table 3.7-11 Terrestrial Communities Potentially Affected by the Station Alternatives (acres): Project Operation (Permanent Impacts)	3.7-112
Table 3.7-12 Special-Status Wildlife Species Potentially Affected by the HMF Alternatives during Project Operation.....	3.7-133
Table 3.7-13 Special-Status Wildlife Species Potentially Affected by the Station Alternatives during Project Operation (Permanent Impacts)	3.7-134
Table 3.7-14 Comparison of Project Impacts on Jurisdictional Waters by Alternative.....	3.7-139
Table 3.7-15 Comparison of Project Impacts on Jurisdictional Waters by Quality and Alternative.....	3.7-140
Table 3.7-16 Habitats of Concern Potentially Affected by the HMF Alternatives during Project Operation.....	3.7-161
Table 3.7-17 Habitats of Concern Potentially Affected by the Station Alternatives during Project Operation.....	3.7-163
Table 3.7-18 Wildlife Movement Corridors Potentially Affected by the HMF Alternatives during Project Operation.....	3.7-169
Table 3.7-19 California Department of Fish and Wildlife recommended restricted activity dates and setback distances by level of disturbance for burrowing owls	3.7-188
Table 3.7-20 San Joaquin kit fox habitat compensation ratios	3.7-198
Table 3.7-21 Conservation Bank Credit Options Identified to Date.....	3.7-205
Table 3.7-22 Overview of Potential Mitigation Property Resources: Potential Acreage Available	3.7-208
Table 3.7-23 Overview of Compensatory Mitigation Property Impacts on Biological Resources	3.7-219
Table 3.7-24 Comparison of Intensity of Effects under NEPA during the Construction Period between HST Alignment Alternatives and the Corresponding Segments of the BNSF Alternative	3.7-227
Table 3.7-25 Comparison of Intensity of Permanent Effects under NEPA from the Project between HST Alignment Alternatives and the Corresponding Segments of the BNSF Alternative	3.7-228
Table 3.7-26 Summary of Intensity of Effects under NEPA for HMF and Station Alternatives	3.7-229
Table 3.7-27 Summary of CEQA Impacts, Mitigation Measures, and Level of Significance after Mitigation	3.7-233
Table 3.8-1 Local Policies and Plans.....	3.8-7
Table 3.8-2 Flow Data from FEMA Flood Insurance Studies Used in Flood Analyses.....	3.8-13
Table 3.8-3 Districts Supplying Water, Sanitation, or Flood Control That Potentially Have Infrastructure Crossing the Proposed HST Alignments	3.8-26
Table 3.8-4 Beneficial Uses of Surface Water in the Project Vicinity	3.8-28
Table 3.8-5 Section 303(d) List of Impaired Waters in the Project Vicinity.....	3.8-29
Table 3.8-6 Major Water Bodies Crossed by the California High-Speed Train Alternative Alignments Fresno to Bakersfield Section	3.8-31
Table 3.8-7 Major Irrigation Canals and Ditches Crossing the Proposed High-Speed Train Alignments.....	3.8-32
Table 3.8-8 Groundwater Subbasins Crossed by the California High-Speed Train Alignment Alternatives—Fresno to Bakersfield Section	3.8-35

Table 3.8-9 FEMA Special Flood Hazard Zone Designations in the Study Area	3.8-36
Table 3.8-10 Floodplains and Floodways Crossed by the California High-Speed Train Alternative Alignments—Fresno to Bakersfield Section	3.8-38
Table 3.8-11 HST Alternatives Water Body Crossings	3.8-43
Table 3.8-12 Acres Disturbed During Construction of HST Alternatives.....	3.8-45
Table 3.8-13 Depth to Groundwater in the Vicinity of the HST Alternatives	3.8-47
Table 3.8-14 Water Quality Objectives Provided in the Water Quality Control Plan for the Tulare Lake Basin	3.8-53
Table 3.8-15 Estimated Basin Sizes for Infiltration Basins Located at the Kings/Tulare Regional Station, Proposed HMF Sites, and Potentially at the Aerial Structure Sections of the Alignment	3.8-57
Table 3.8-16 Groundwater Extraction in the Tulare Lake Hydrologic Region	3.8-63
Table 3.8-17 Approximate Distances to Groundwater Wells near the HMF Facility Locations.....	3.8-64
Table 3.8-18 HST Alternatives Area in the Special Flood Hazard Area (acres)	3.8-65
Table 3.9-1 Local Plans and Policies.....	3.9-3
Table 3.9-2 Summary of Mapped Surficial Geologic Units.....	3.9-11
Table 3.9-3 Predominant Geologic Formations between City of Fresno and City of Bakersfield.....	3.9-11
Table 3.9-4 Summary of Groundwater Depth at Various Locations.....	3.9-12
Table 3.9-5 Summary of Soil Associations.....	3.9-15
Table 3.10-1 Local Plans and Policies.....	3.10-5
Table 3.10-2 Landfills within 0.25 Mile of the Study Area.....	3.10-11
Table 3.10-3 Potentially Affected PEC Sites by Alternative Alignment	3.10-15
Table 3.10-4 Potentially Affected PEC Sites by Heavy Maintenance Facility Alternative	3.10-25
Table 3.10-5 Educational Facilities within 0.25 Mile of Alignment Alternative Rights-of- Way.....	3.10-26
Table 3.10-6 Summary of Significant Hazardous Material and Waste Impacts and Mitigation Measures.....	3.10-40
Table 3.11-1 General Plans and Other Plans Considered.....	3.11-5
Table 3.11-2 Airport Plans Considered	3.11-6
Table 3.11-3 Fire Departments and Equipment in the Fresno to Bakersfield HST Study Area.....	3.11-8
Table 3.11-4 Fire, Law Enforcement, and Emergency Medical Services Locations by Heavy Maintenance Facility Site	3.11-16
Table 3.11-5 Airports, Airstrips, and Heliports within 2 Miles of Alternative Alignment Centerlines	3.11-19
Table 3.11-6 Educational Facilities within 0.25 Mile of Alternative Construction Footprints.....	3.11-20
Table 3.11-7 Number of Temporary Road Closures for Fresno to Bakersfield Alternatives	3.11-28
Table 3.11-8 Location of High-Speed Train Facilities Relative to Airport Airspace	3.11-38
Table 3.11-9 CEQA Significance Conclusions for Safety and Security.....	3.11-48
Table 3.12-1 Existing and Projected Populations.....	3.12-17
Table 3.12-2 Minority Group Representation in the Region	3.12-22
Table 3.12-3 Housing Characteristics (2010)	3.12-27
Table 3.12-4 County and City Fiscal Conditions for Fiscal Year 2008–2009	3.12-35
Table 3.12-5 Cities and Communities Affected by Alignment, Station, and HMF Alternatives	3.12-37
Table 3.12-6 Minority and Low-Income Percentages in the Region	3.12-43
Table 3.12-7 Resource Impacts from Project Operation Potentially Affecting Community Character and Cohesion — Impacts Common to All Alternatives	3.12-60
Table 3.12-8 Potential Impacts on Community Cohesion, Neighborhoods, and Community Resources during Operation—Proposed HMF Sites	3.12-73

Table 3.12-9 Residential Displacement under the BNSF Alternative	3.12-77
Table 3.12-10 Change in Residential Displacement Relative to the BNSF Alternative	3.12-79
Table 3.12-11 Commercial and Industrial Relocations under the BNSF Alternative	3.12-85
Table 3.12-12 Change in Commercial and Industrial Business Relocation Relative to the BNSF Alternative	3.12-87
Table 3.12-13 Agricultural Parcel Splits and Displaced Facilities under the BNSF Alternative	3.12-93
Table 3.12-14 Change in Agricultural Parcel Splits and Facilities Relative to the BNSF Alternative.....	3.12-94
Table 3.12-15 Effects of the Proposed Alignment Alternatives on Agricultural Revenues and Employment	3.12-103
Table 3.12-16 Environmental Justice Construction Impacts for the BNSF Alternative	3.12-108
Table 3.12-17 Operation-Related Environmental Justice Impacts for the BNSF Alternative.....	3.12-120
Table 3.12-18 Summary of Significant Social Impacts and Mitigation Measures	3.12-145
Table 3.13-1 Permanent Land Use Impacts by Alternative (acres)	3.13-39
Table 3.13-2 Land Use Designations Permanently Affected by Each Alternative (acres) ...	3.13-40
Table 3.13-3 Permanent Land Impacts by Potential HMF Site (acres)	3.13-48
Table 3.13-4 Acreage of Existing Land Uses and Current Zoning Opportunities Within the HST Station Study Areas	3.13-57
Table 3.13-5 CEQA Significance Conclusions for Station Planning, Land Use, and Development	3.13-63
Table 3.14-1 Local Plans and Policies.....	3.14-5
Table 3.14-2 Important Farmland and Grazing Land in Fresno, Kings, Tulare, and Kern Counties (acres).....	3.14-14
Table 3.14-3 Farmland Conversions in Fresno, Kings, and Tulare Counties from 2000 to 2008 and Kern County from 2004 to 2008.....	3.14-15
Table 3.14-4 Protected Farmland in Fresno, Kings, Tulare, and Kern Counties (acres) (2008)	3.14-26
Table 3.14-5 Maximum Amount of Important Farmlands Permanently Affected by Each Alternative Alignment in Comparison to the Corresponding Segment of the BNSF Alternative (acres).....	3.14-35
Table 3.14-6 Protected Farmland Permanently Converted by Each Alignment in Comparison to the Corresponding Segment of the BNSF Alternative (acres)	3.14-39
Table 3.14-7 Important Farmlands within Potential Heavy Maintenance Facility Alternative Sites (acres).....	3.14-40
Table 3.14-8 Important Farmland Temporarily Used for Project Construction (acres)	3.14-42
Table 3.14-9 Farmland Conversion Impact Rating for the BNSF Alternative in Fresno, Kings, Tulare, and Kern Counties.....	3.14-48
Table 3.14-10 Protected Farmland Permanently Affected by the BNSF Alternative (acres)	3.14-53
Table 3.14-11 Protected Farmland Potentially Forced into Williamson Act and FSZ Nonrenewal (acres)	3.14-53
Table 3.14-12 Summary of Significant Agricultural Lands Impacts and Mitigation Measures	3.14-65
Table 3.15-1 Plans and Policies of Local Jurisdictions	3.15-4
Table 3.15-2 Parks, Recreation, and Open-Space Resources Potentially Affected by HST Alternatives	3.15-13
Table 3.15-3 School District Play Areas and Recreation Facilities Potentially Affected by HST Alternatives	3.15-16
Table 3.15-4 Parks, Recreation, and Open-Space Resources and School District Play Areas and Recreation Facilities in the Study Area for the Fresno Station.....	3.15-18

Table 3.15-5 Parks, Recreation, and Open-Space Resources and School District Play Areas and Recreation Facilities in the Study Area for the Bakersfield Station Alternatives	3.15-18
Table 3.15-6 Permanent Acquisition Acreage of Parks, Recreation, and Open-Space Resources by Alternative Alignment	3.15-39
Table 3.15-7 Summary of Significant Impacts and Mitigation Measures for Parks, Recreation, and Open-Space Resources	3.15-52
Table 3.15-8 Summary of Significant Impacts and Mitigation Measures for School District Play Areas and Recreation Facilities	3.15-55
Table 3.16-1 Summary of Local Plans and Policies	3.16-2
Table 3.16-2 Characteristics of Typical HST Components.....	3.16-61
Table 3.16-3 Summary of Impacts under CEQA and NEPA by HST Alternative	3.16-65
Table 3.16-4 Summary of Visual Quality Changes and Impacts at Key Viewpoints.....	3.16-70
Table 3.16-5 Summary of Significant Aesthetics and Visual Resources Impacts and Mitigation Measures.....	3.16-148
Table 3.17-1 Plans, Policies, and Ordinances	3.17-8
Table 3.17-2 Summary of Outreach Efforts to Identify Other Consulting/Concurring Parties.....	3.17-22
Table 3.17-3 Tribal Contacts and Consultation.....	3.17-25
Table 3.17-4 Prehistoric Cultural Periods	3.17-45
Table 3.17-5 Previously Recorded or Known Historic Archaeological Sites Within 0.25 Mile of the Archaeological APE.....	3.17-49
Table 3.17-6 Archaeological Resources within the APE	3.17-52
Table 3.17-7 Significant Historic Architectural Resources by Alternative	3.17-61
Table 3.17-8 Paleontological Sensitivity Ratings Employed for This Analysis	3.17-95
Table 3.17-9 Geologic Units Underlying the Study Area	3.17-96
Table 3.17-10 Construction and/or Operational Effects and Changes (Section 106 and CEQA) to Historic Architectural Resources by Component of the HST Project	3.17-107
Table 3.17-11 CEQA Significant Impacts to Cultural Resources by Component of the HST Project	3.17-139
Table 3.18-1 Population Growth, 2000 – 2010.....	3.18-13
Table 3.18-2 Population Projections, 2010 – 2035.....	3.18-14
Table 3.18-3 Fresno, Kings, Tulare, and Kern County and Regional Employment by Industry, 2000 – 2016	3.18-16
Table 3.18-4 Regional Long-Range Employment Projections, 2010 and 2035	3.18-17
Table 3.18-5 Labor Force Characteristics – Counties, Major Cities, and Unincorporated Areas in the Study Area	3.18-17
Table 3.18-6 Existing Housing Units and Projected Housing Units.....	3.18-19
Table 3.18-7 BNSF Alternative Employment Impacts during Construction.....	3.18-22
Table 3.18-8 Hanford West Bypass 1 Alternative Employment Impacts during Construction Compared to the BNSF Alternative.....	3.18-22
Table 3.18-9 Hanford West Bypass 1 Modified Alternative Employment Impacts during Construction Compared to the BNSF Alternative.....	3.18-23
Table 3.18-10 Hanford West Bypass 2 Alternative Employment Impacts during Construction Compared to the BNSF Alternative.....	3.18-24
Table 3.18-11 Corcoran Elevated Alternative Relative Employment Impacts during Construction Compared to the BNSF Alternative.....	3.18-25
Table 3.18-12 Corcoran Bypass Alternative Employment Impacts during Construction Compared to the BNSF Alternative	3.18-25
Table 3.18-13 Allensworth Bypass Alternative Employment Impacts during Construction Compared to the BNSF Alternative	3.18-26
Table 3.18-14 Wasco-Shafter Bypass Alternative Employment Impacts during Construction Compared to the BNSF Alternative.....	3.18-27

Table 3.18-15 Bakersfield South Alternative Employment Impacts during Construction Compared to the BNSF Alternative.....	3.18-27
Table 3.18-16 Bakersfield Hybrid Alternative Employment Impacts during Construction Compared to the BNSF Alternative.....	3.18-28
Table 3.18-17 Fresno, Kings/Tulare Regional, and Bakersfield Stations and HMF Costs (2010 \$M)	3.18-29
Table 3.18-18 Employment Impacts during Construction of the BNSF Stations.....	3.18-30
Table 3.18-19 Employment Impacts during Construction of the HMF.....	3.18-30
Table 3.18-20 Regional Projected and Induced Population and Employment Growth	3.18-33
Table 3.19-1 Geographic Extent of Analysis for Various Pollutant Types.....	3.19-11
Table 3.19-2 Summary of Cumulative Impacts	3.19-51
Table 4-1 Park, Recreation, Open Space, and Wildlife and Waterfowl Refuges Evaluated for Section 4(f) Use	4-19
Table 4-2 Resources Listed in, or Determined or Recommended Eligible for, the National Register of Historic Places.....	4-20
Table 4-3 Summary of Section 4(f) Uses of NRHP-Listed or Eligible Properties	4-46
Table 4-4 Measures to Minimize Harm.....	4-56
Table 4-5 Least Harm Analysis for BNSF-Hanford East Alternative and Hanford West Bypass Alternatives	4-64
Table 4-6 Preliminary Least Harm Analysis for BNSF, Bakersfield South, and Bakersfield Hybrid Alternatives.....	4-72
Table 5.2-1 Capital Cost of the HST Alternatives	5-5
Table 5.2-2 Cost for Heavy Maintenance Facility Site Alternatives.....	5-11
Table 5.3-1 Optimal Express Travel Times from Fresno to Bakersfield and Other Cities (hours:minutes)	5-12
Table 5.3-2 Annual Phase Full System O&M Cost, Year 2035(2010 \$Millions)	5-13
Table 5.3-3 Annual 2035 O&M Costs Apportioned to the Fresno to Bakersfield Section (2010 \$millions).....	5-14
Table 7-1 Natural Resources Impacts in the Fresno to Bakersfield Section.....	7-9
Table 7-2 Community Resource Impacts in the Fresno to Bakersfield Section	7-10
Table 8-1 Public and Agency Meetings	8-19

Figures

Figure S-1 California HST System initial study corridors	S-2
Figure S-2 Fresno to Bakersfield Section project alternatives.....	S-3
Figure 1-1 Statewide HST System.....	1-2
Figure 1-2 Fresno to Bakersfield HST Project Corridor	1-8
Figure 1-3 Current and future California population (in millions).....	1-9
Figure 1-4 Intercity trips in California (in millions)	1-12
Figure 1-5 Major intercity travel routes and airports	1-13
Figure 1-6 Corridor alignments and stations selected at conclusion of Statewide Program EIR/EIS	1-32
Figure 1-7 Map Showing Agency Decision on Corridor Alignments and Stations at Conclusion of Tier 1 Processes in 2005, 2008, and 2012	1-34
Figure 1-8 Phasing Approach	1-36
Figure 2-1 California HST System Initial Study Corridors.....	2-2
Figure 2-2 Examples of Japanese Shinkansen high-speed trains.....	2-5
Figure 2-3 Example of an at-grade profile showing contact wire system and vertical arms of the pantograph power pickups	2-6
Figure 2-4 Examples of existing stations	2-7
Figure 2-5 Simulated and plan views of a functional station and its various components	2-7
Figure 2-6 At-grade typical cross section.....	2-9
Figure 2-7 Retained-fill typical cross section	2-10

Figure 2-8 Retained-cut typical cross section	2-10
Figure 2-9 Elevated structure typical cross sections	2-10
Figure 2-10 Straddle bent typical cross section	2-11
Figure 2-11 Replacing local at-grade crossings with new overcrossings above HST guideway and existing railroad trackway	2-13
Figure 2-12 Adding local roadway overcrossings above HST guideway	2-13
Figure 2-13 Typical cross section of roadway grade-separated beneath HST guideway	2-13
Figure 2-14 Traction power substation	2-14
Figure 2-15 Switching station	2-14
Figure 2-16 Paralleling station	2-14
Figure 2-17 Conceptual HMF layout	2-17
Figure 2-18 Fresno subsection alternatives	2-22
Figure 2-19 Rural subsection alternatives	2-26
Figure 2-20 Bakersfield subsection alternatives	2-33
Figure 2-21 HST alternatives and HMF sites carried forward for further study	2-35
Figure 2-22 Existing intercity transportation network	2-42
Figure 2-23 No Project Alternative planned improvements in Fresno County	2-46
Figure 2-24 No Project Alternative planned improvements in Kings County	2-47
Figure 2-25 No Project Alternative planned improvements in Tulare County	2-48
Figure 2-26 No Project Alternative planned improvements in Kern County	2-49
Figure 2-27 Fresno County HST alternatives	2-55
Figure 2-28 Kings County HST alternatives	2-56
Figure 2-29 Tulare County HST alternatives	2-57
Figure 2-30 Kern County HST alternatives	2-58
Figure 2-31 Wildlife crossing structure	2-60
Figure 2-32 BNSF Alternative without shared right-of-way	2-62
Figure 2-33 BNSF Alternative showing opportunity for shared right-of-way	2-63
Figure 2-34 Fresno Station conceptual designs	2-74
Figure 2-35 Fresno Station	2-75
Figure 2-36 Southern Pacific Railroad depot property and Fresno Station	2-77
Figure 2-37 Kings/Tulare Regional Station–East Alternative	2-81
Figure 2-38 Kings/Tulare Regional Station–West Alternative (at-grade)	2-82
Figure 2-39 Kings/Tulare Regional Station–West Alternative (below-grade)	2-83
Figure 2-40 Bakersfield Station conceptual designs	2-84
Figure 2-41 Bakersfield Station–North Alternative	2-85
Figure 2-42 Bakersfield Station–South Alternative	2-86
Figure 2-43 Bakersfield Station–Hybrid Alternative	2-87
Figure 2-44 Location of state facilities affected by HST alternatives	2-90
Figure 2-45 State Route 46 reconfiguration	2-91
Figure 2-46 State Route 137 reconfiguration	2-91
Figure 2-47 Locations of potential heavy maintenance facility sites	2-94
Figure 2-48 Potential Fresno Works–Fresno HMF Site	2-97
Figure 2-49 Potential Kings County–Hanford HMF Site	2-98
Figure 2-50 Potential Kern Council of Governments–Wasco HMF Site	2-99
Figure 2-51 Potential Kern Council of Governments–Shafter East and West HMF sites	2-100
Figure 2-52 Revenue service and ridership build-up	2-105
Figure 2-53 Northern California Phase 1 Transit Connectivity Map	2-108
Figure 2-54 San Joaquin Valley Phase 1 Transit Connectivity Map	2-109
Figure 2-55 Southern California Phase 1 Transit Connectivity Map	2-110
Figure 3.1-1 Shifts of Roadways and Other Infrastructure	3.1-5
Figure 3.2-1 Regionally significant roads in Fresno	3.2-13
Figure 3.2-2 Regionally significant roads in Hanford	3.2-14
Figure 3.2-3 Regionally significant roads in Corcoran	3.2-15

Figure 3.2-4 Regionally significant roads in Wasco	3.2-16
Figure 3.2-5 Regionally significant roads in Bakersfield	3.2-17
Figure 3.2-6a Study intersections—Fresno Station area	3.2-21
Figure 3.2-6b Study intersections—Fresno Station area	3.2-22
Figure 3.2-6c Study intersections—Fresno Station area	3.2-23
Figure 3.2-7 Roadway classifications—Fresno Station area	3.2-24
Figure 3.2-8a Average daily traffic, number of lanes, and speed—Fresno Station area	3.2-25
Figure 3.2-8b Average daily traffic, number of lanes, and speed—Fresno Station area	3.2-26
Figure 3.2-8c Average daily traffic, number of lanes, and speed—Fresno Station area	3.2-27
Figure 3.2-9a Intersection level of service—Fresno Station area	3.2-28
Figure 3.2-9b Intersection level of service—Fresno Station area	3.2-29
Figure 3.2-9c Intersection level of service—Fresno Station area	3.2-30
Figure 3.2-10 Study intersections: Kings/Tulare Regional Station—East area	3.2-33
Figure 3.2-11 Roadway classifications: Kings/Tulare Regional Station—East area	3.2-34
Figure 3.2-12 Average daily traffic, number of lanes, and speed: Kings/Tulare Regional Station—East area	3.2-35
Figure 3.2-13 Intersection level of service: Kings/Tulare Regional Station—East area	3.2-36
Figure 3.2-14 Study intersections: Kings/Tulare Regional Station—West area	3.2-39
Figure 3.2-15 Roadway classifications: Kings/Tulare Regional Station—West area	3.2-40
Figure 3.2-16 Average daily traffic, number of lanes, and speed: Kings/Tulare Regional Station—West	3.2-41
Figure 3.2-17 Intersection level of service: Kings/Tulare Regional Station—West area	3.2-42
Figure 3.2-18 Study intersections—Bakersfield Station area	3.2-45
Figure 3.2-19 Roadway classifications—Bakersfield Station area	3.2-46
Figure 3.2-20 Average daily traffic, number of lanes, and speed—Bakersfield Station area	3.2-47
Figure 3.2-21 Intersection level of service—Bakersfield Station area	3.2-48
Figure 3.2-22 Fresno County HST Alternatives	3.2-53
Figure 3.2-23 Kings County HST Alternatives	3.2-54
Figure 3.2-24 Tulare County HST Alternatives	3.2-55
Figure 3.2-25 Kern County HST Alternatives	3.2-56
Figure 3.2-26a Future (2035) Plus Project intersection LOS in the Fresno Station area	3.2-57
Figure 3.2-26b Future (2035) Plus Project intersection LOS in the Fresno Station area	3.2-58
Figure 3.2-26c Future (2035) Plus Project intersection LOS in the Fresno Station area	3.2-59
Figure 3.2-27 Future (2035) Plus Project intersection LOS in the Kings/Tulare Regional Station—East Alternative	3.2-61
Figure 3.2-28 Future (2035) Plus Project intersection LOS in the Kings/Tulare Regional Station—West Alternative	3.2-62
Figure 3.2-29 Future (2035) Plus Project intersection LOS in the Bakersfield Station— North and South Alternatives	3.2-105
Figure 3.2-30 Future (2035) Plus Project intersection LOS in the Bakersfield Station— Hybrid Alternative	3.2-106
Figure 3.3-1 San Joaquin Valley Air Basin	3.3-15
Figure 3.3-2 Projected national MSAT emission trends (2010–2050) for vehicles operating on roadways using EPA’s MOVES2010b model	3.3-23
Figure 3.3-3 Air quality ambient air monitors	3.3-38
Figure 3.3-4 CO hot-spot evaluation intersection locations	3.3-73
Figure 3.4-1 Typical L_{max} noise levels	3.4-4
Figure 3.4-2 Typical levels of ground-borne vibration	3.4-5
Figure 3.4-3 Federal Railroad Authority noise impact criteria	3.4-8
Figure 3.4-4 Fresno area: Noise and vibration measurement sites	3.4-20
Figure 3.4-5 Hanford / Alt 1 area: Noise and vibration measurement sites	3.4-21
Figure 3.4-6 Hanford /Alt 2 area: Noise and vibration measurement sites	3.4-22

Figure 3.4-7 Corcoran area: Noise and vibration measurement sites.....	3.4-23
Figure 3.4-8 Bakersfield area: Noise and vibration measurement sites.....	3.4-24
Figure 3.4-9 Fresno area: Severe and moderate noise impacts	3.4-36
Figure 3.4-10 Hanford / Alt 1 area: Severe and moderate noise impacts.....	3.4-37
Figure 3.4-11 Hanford / Alt 2 area: Severe and moderate noise impacts.....	3.4-38
Figure 3.4-12 Corcoran area: Severe and moderate noise impacts	3.4-39
Figure 3.4-13 Bakersfield area: Severe and moderate noise impacts	3.4-40
Figure 3.4-14 Examples of sound barriers for rail corridors.....	3.4-59
Figure 3.4-15 Fresno area: Potential sound barrier sites.....	3.4-65
Figure 3.4-16 Hanford / Alt 1 area: Potential sound barrier sites.....	3.4-66
Figure 3.4-17 Hanford / Alt 2 area: Potential sound barrier sites.....	3.4-67
Figure 3.4-18 Corcoran area: Potential sound barrier sites	3.4-68
Figure 3.4-19 Bakersfield area: Potential sound barrier sites.....	3.4-69
Figure 3.5-1 EMF/EMI measurement site locations	3.5-10
Figure 3.6-1 Boundaries of agricultural water districts and community water service areas	3.6-24
Figure 3.6-2 California energy consumption by sector, 2008	3.6-33
Figure 3.6-3 California transportation energy consumption by source, 2008	3.6-34
Figure 3.6-4 Electric transmission lines	3.6-38
Figure 3.6-5 Natural gas pipelines	3.6-39
Figure 3.6-6 Petroleum and fuel pipelines	3.6-40
Figure 3.6-7 Communication facilities and sites.....	3.6-41
Figure 3.7-1 Schematic of biological resource study areas	3.7-11
Figure 3.7-2 Direct and indirect impact evaluations for jurisdictional waters	3.7-19
Figure 3.7-3a Habitats of concern observed within the Special-Status Plant Study Area (special-status plant communities)	3.7-33
Figure 3.7-3b Habitats of concern observed within the Wetlands Study Area (jurisdictional waters)	3.7-34
Figure 3.7-3c Habitats of concern (critical habitat, public lands, conservation easements and banks)	3.7-39
Figure 3.7-3d Habitats of concern (recovery plans and habitat conservation plans).....	3.7-41
Figure 3.7-4 Wildlife movement corridors.....	3.7-46
Figure 3.7-5 Special-status species (plants) within the Special-Status Plant Study Area	3.7-54
Figure 3.7-6 Special-status species (wildlife) within the Habitat Study Area	3.7-59
Figure 3.8-1 Regional hydrologic setting	3.8-16
Figure 3.8-2 Floodplains within Fresno to Bakersfield study area	3.8-19
Figure 3.8-3 Floodplains in Fresno.....	3.8-20
Figure 3.8-4 Floodplains in Hanford.....	3.8-21
Figure 3.8-5 Floodplains in Bakersfield.....	3.8-22
Figure 3.8-6 Boundaries of agricultural water districts and community water service areas	3.8-27
Figure 3.8-7 Groundwater basins.....	3.8-34
Figure 3.9-1 Surficial geology within the study area	3.9-9
Figure 3.9-2 Soil associations within the study area	3.9-14
Figure 3.9-3 Hazardous and potentially hazardous faults within 62 miles of the HST alternatives.....	3.9-18
Figure 3.9-4 Historic earthquakes and magnitudes within 62 miles of the HST alternatives.....	3.9-20
Figure 3.9-5 Calculated peak ground acceleration (2% probability of exceedance in 50 years)	3.9-21
Figure 3.9-6 Inundation in the study area due to catastrophic dam failures.....	3.9-23
Figure 3.9-7 Oil, gas, and geothermal fields in the Fresno to Bakersfield Section	3.9-25
Figure 3.9-8 Erodible soils in the study area	3.9-31

Figure 3.10-1 Fresno area: Locations of conceivable and current PECs and schools within the project study area.....	3.10-18
Figure 3.10-2 Hanford area: Locations of conceivable and current PECs and schools within the project study area.....	3.10-20
Figure 3.10-3 Corcoran area: Locations of conceivable and current PECs and schools within the project study area.....	3.10-21
Figure 3.10-4 Wasco-Shafter area: Locations of conceivable and current PECs and schools within the project study area	3.10-23
Figure 3.10-5 Bakersfield area: Locations of conceivable and current PECs and schools within the project study area.....	3.10-24
Figure 3.11-1 Fatalities (per 100 million passenger miles in 2008)	3.11-2
Figure 3.11-2 Total passenger fatalities in 2008	3.11-2
Figure 3.11-3 Fresno area: Safety and security existing conditions.....	3.11-10
Figure 3.11-4 Hanford area: Safety and security existing conditions.....	3.11-11
Figure 3.11-5 Corcoran area: Safety and security existing conditions	3.11-12
Figure 3.11-6 Wasco-Shafter area: Safety and security existing conditions	3.11-13
Figure 3.11-7 Bakersfield area: Safety and security existing conditions.....	3.11-14
Figure 3.11-8 Derailment wall and parapet	3.11-32
Figure 3.11-9 High-speed train derailment.....	3.11-33
Figure 3.12-1 Fresno to Bakersfield Section alternatives.....	3.12-12
Figure 3.12-2 Districts within the city of Fresno.....	3.12-20
Figure 3.12-3 Districts within the city of Bakersfield.....	3.12-26
Figure 3.12-4 Minority and Low-Income Populations Fresno County	3.12-44
Figure 3.12-5 Minority and Low-Income Populations Kings County.....	3.12-45
Figure 3.12-6 Minority and Low-Income Populations Tulare County	3.12-46
Figure 3.12-7 Minority and Low-Income Populations Kern County	3.12-47
Figure 3.12-8 Minority and Low-Income Populations in the Reference Community.....	3.12-48
Figure 3.13-1 Existing land use—Fresno station	3.13-22
Figure 3.13-2 Current zoning—Fresno station	3.13-23
Figure 3.13-3 Existing land use – Kings/Tulare Regional Station—East Alternative	3.13-25
Figure 3.13-4 Current zoning – Kings/Tulare Regional Station—East Alternative	3.13-27
Figure 3.13-5 Existing land use – Kings/Tulare Regional Station—West Alternative.....	3.13-28
Figure 3.13-6 Current zoning – Kings/Tulare Regional Station—West Alternative.....	3.13-29
Figure 3.13-7 Existing land use—Bakersfield stations.....	3.13-31
Figure 3.13-8 Current zoning—Bakersfield stations.....	3.13-32
Figure 3.14-1 Important Farmland and Grazing Land in the Fresno project vicinity	3.14-16
Figure 3.14-2 Important Farmland and Grazing Land in the Hanford project vicinity	3.14-17
Figure 3.14-3 Important Farmland and Grazing Land in the Corcoran project vicinity.....	3.14-18
Figure 3.14-4 Important Farmland and Grazing Land in the Wasco–Shafter project vicinity	3.14-19
Figure 3.14-5 Important Farmland and Grazing Land in the Bakersfield project vicinity...	3.14-20
Figure 3.14-6 Distribution of crop cover in the Fresno project vicinity.....	3.14-21
Figure 3.14-7 Distribution of crop cover in the Hanford project vicinity.....	3.14-22
Figure 3.14-8 Distribution of crop cover in the Corcoran project vicinity	3.14-23
Figure 3.14-9 Distribution of crop cover in the Wasco–Shafter project vicinity.....	3.14-24
Figure 3.14-10 Distribution of crop cover in the Bakersfield project vicinity	3.14-25
Figure 3.14-11 Protected lands in Fresno project vicinity	3.14-27
Figure 3.14-12 Protected lands in Hanford project vicinity	3.14-28
Figure 3.14-13 Protected lands in Corcoran project vicinity	3.14-29
Figure 3.14-14 Protected lands in Wasco–Shafter project vicinity	3.14-30
Figure 3.14-15 Protected lands in Bakersfield project vicinity	3.14-31
Figure 3.15-1 Fresno area: Parks, recreation, and open-space resources and school district play areas and recreation facilities in the project study areas.....	3.15-8

Figure 3.15-2 Hanford area: Parks, recreation, and open-space resources and school district play areas and recreation facilities in the project study areas.....	3.15-9
Figure 3.15-3 Corcoran area: Parks, recreation, and open-space resources and school district play areas and recreation facilities in the project study areas.....	3.15-10
Figure 3.15-4 Wasco-Shafter area: Parks, recreation, and open-space resources and school district play areas and recreation facilities in the project study areas.....	3.15-11
Figure 3.15-5 Bakersfield area: Parks, recreation, and open-space resources and school district play areas and recreation facilities in the project study areas.....	3.15-12
Figure 3.15-6 Chukchansi Park, City of Fresno	3.15-28
Figure 3.15-7 Colonel Allensworth State Historic Park, Tulare County	3.15-30
Figure 3.15-8 Allensworth Ecological Reserve, Tulare County	3.15-31
Figure 3.15-9 Proposed Orchard Park, City of Shafter	3.15-35
Figure 3.15-10 Owens Intermediate School, City of Bakersfield	3.15-41
Figure 3.16-1 Fresno to Bakersfield alignments and landscape units.....	3.16-15
Figure 3.16-2 City of Fresno Landscape Units.....	3.16-16
Figure 3.16-3 Central Fresno Landscape Unit: Representative views, photo locations.....	3.16-17
Figure 3.16-4 Central Fresno Landscape Unit: Representative views, industrial image type	3.16-18
Figure 3.16-5a Central Fresno Landscape Unit: Representative views, typical central business district image types	3.16-19
Figure 3.16-5b Central Fresno Landscape Unit: Representative views, typical central business district image types	3.16-20
Figure 3.16-6 Central Fresno Landscape Unit: Representative views, typical Fresno Chinatown image types.....	3.16-21
Figure 3.16-7 San Joaquin Valley Rural/Agricultural Landscape Unit: Representative views, typical valley image types	3.16-24
Figure 3.16-8 San Joaquin Valley Rural/Agricultural Landscape Unit: Representative views, rural residential image types	3.16-25
Figure 3.16-9 San Joaquin Valley Rural/Agricultural Landscape Unit: Representative views, riparian corridor image type	3.16-26
Figure 3.16-10 Corcoran Landscape Unit: Representative views, photo locations.....	3.16-28
Figure 3.16-11 Corcoran Landscape Unit: Representative views, downtown Corcoran (photos)	3.16-29
Figure 3.16-12 Wasco Landscape Unit: Representative views, photo locations	3.16-30
Figure 3.16-13 Wasco Landscape Unit: Representative views, downtown Wasco (photos)	3.16-31
Figure 3.16-14 Shafter Landscape Unit: Representative views, photo locations	3.16-32
Figure 3.16-15 Shafter Landscape Unit: Representative views, Shafter (photos)	3.16-33
Figure 3.16-16 Colonel Allensworth State Historic Park Landscape Unit: Representative views, photo locations	3.16-35
Figure 3.16-17 Colonel Allensworth State Historic Park Landscape Unit: Representative views, Colonel Allensworth State Historic Park (photos)	3.16-36
Figure 3.16-18 City of Bakersfield Landscape Units.....	3.16-37
Figure 3.16-19 Rosedale/Greenacres Landscape Unit: Representative views, photo locations.....	3.16-38
Figure 3.16-20 Rosedale/Greenacres Landscape Unit: Representative views, Rosedale/Greenacres (photos).....	3.16-39
Figure 3.16-21 Kern River Landscape Unit: Representative views, photo locations.....	3.16-41
Figure 3.16-22 Kern River Landscape Unit: Representative views, Kern River (photos) ...	3.16-42
Figure 3.16-23 Central Bakersfield Landscape Unit: Representative views, photo locations.....	3.16-44
Figure 3.16-24 Central Bakersfield Landscape Unit: Representative views, rail yard industrial image type	3.16-45

Figure 3.16-25 Central Bakersfield Landscape Unit: Representative views, residential image type	3.16-46
Figure 3.16-26a Central Bakersfield Landscape Unit: Representative views, central business district image types.....	3.16-48
Figure 3.16-26b Central Bakersfield Landscape Unit: Representative views, central business district image types.....	3.16-49
Figure 3.16-27 East Bakersfield Landscape Unit: Representative views, photo locations ..	3.16-51
Figure 3.16-28 East Bakersfield Landscape Unit: Representative views, industrial image types	3.16-52
Figure 3.16-29 East Bakersfield Landscape Unit: Representative views, residential image types.....	3.16-53
Figure 3.16-30 San Joaquin Valley Rural/Agricultural Landscape Unit: Key viewpoints– Hanford West alternatives alignments	3.16-54
Figure 3.16-31 Representative viewpoints: Residential image types	3.16-57
Figure 3.16-32 Key viewpoint 1: Downtown Fresno Station–Mariposa Alternative from downtown (H Street at Tulare Street), looking west [visual simulations]	3.16-80
Figure 3.16-33a Key viewpoint 2: Downtown Fresno Station–Mariposa Alternative from Chinatown (China Alley between F and G streets), looking north [existing view]	3.16-82
Figure 3.16-33b Key viewpoint 2: Downtown Fresno Station–Mariposa Alternative from Chinatown (China Alley between F and G streets), looking north [visual simulations].....	3.16-83
Figure 3.16-34 Key viewpoint 3: Simulations of high-speed train at-grade in rural landscape.....	3.16-85
Figure 3.16-35 Key viewpoint 3: Simulations of high-speed train on elevated guideway in rural landscape	3.16-86
Figure 3.16-36 Key viewpoint 4: Existing view and simulation of typical new rural road overcrossing	3.16-87
Figure 3.16-37 Key viewpoint 5: Existing view and simulation of typical view of HST alignment as seen by motorists at foreground distance	3.16-89
Figure 3.16-38 Key viewpoint 6: Existing view and simulation of typical view of HST alignment as seen by rural residents at near-foreground distance	3.16-90
Figure 3.16-39 Key viewpoint 7: Existing view and simulation of typical view of HST alignment as seen by rural residents in proximity to rural agro-industrial settings	3.16-91
Figure 3.16-40 Key viewpoint 8: Existing and simulated views of Kings/Tulare Regional Station from 8th Avenue (SR 43).....	3.16-93
Figure 3.16-41 Key viewpoint 9: Existing view and simulated view of high-speed train in Corcoran, from Whitley Avenue near Otis Avenue, looking east	3.16-95
Figure 3.16-42 Key viewpoint 10: Existing view and simulated view of high-speed train in Wasco, from 7th Avenue and F Street, looking east toward the Amtrak Station....	3.16-96
Figure 3.16-43 Key viewpoint 11: Existing view and simulated view of high-speed train in Shafter from Poso Avenue and SR 43, looking toward the Shafter Depot Museum	3.16-97
Figure 3.16-44 Key viewpoint 12: Existing view and simulated view of high-speed train from Colonel Allensworth State Historic Park	3.16-99
Figure 3.16-45 Key viewpoint 13: Existing view and simulated view of BNSF Alternative at-grade in Rosedale/Greenacres from Verdugo Lane, looking south.....	3.16-101
Figure 3.16-46 Key viewpoint 14: Existing view and simulated view of high-speed train on BNSF Alternative in Rosedale/Greenacres from Palm Avenue, looking east.....	3.16-102
Figure 3.16-47 Key viewpoint 15: Existing view and simulated view of high-speed train on BNSF Alternative from Kern River Parkway Bicycle Trail, looking north	3.16-104
Figure 3.16-48 Key viewpoint 16: Existing view and simulated view of high-speed train from Bakersfield High School stadium, looking northeast	3.16-106
Figure 3.16-49 Key viewpoint 17: Existing view and simulated view of high-speed train from L Street near Truxtun Avenue in downtown Bakersfield	3.16-107

Figure 3.16-50a Key viewpoint 18: Bakersfield Station–North Alternative, existing view	3.16-109
Figure 3.16-50b Key viewpoint 18: Bakersfield Station–North Alternative from Truxtun Avenue, visual simulations	3.16-110
Figure 3.16-50c Key viewpoint 18: Bakersfield Station–North Alternative, visual simulations	3.16-111
Figure 3.16-51 Key viewpoint 19: Existing and simulated views of BNSF Alternative from Robinson Street at Eureka Street, looking north	3.16-113
Figure 3.16-52 Key viewpoint 20: Existing view and simulated view of Hanford West Bypass alternatives from Mt. Whitney Avenue in Laton, looking east	3.16-115
Figure 3.16-53 Key viewpoint 21: Existing and simulated views of Kings Tulare Regional Station–West Alternative (below-grade) from 13th Avenue, looking southeast	3.16-118
Figure 3.16-54 Key viewpoint 22: Existing and simulated views of Kings Tulare Regional Station–West Alternative (at-grade) from 13th Avenue, looking northeast	3.16-119
Figure 3.16-55 Key viewpoint 23: Existing and simulated views of high-speed train on Allensworth Bypass Alternative, looking west from Colonel Allensworth State Historic Park	3.16-122
Figure 3.16-56 Key viewpoint 15a: Existing view and simulated view of high-speed train on Bakersfield South Alternative from Kern River Parkway Bicycle Trail, looking north	3.16-123
Figure 3.16-57 Key viewpoint 24: Bakersfield Station–South Alternative from S Street	3.16-125
Figure 3.16-58 Key viewpoint 25: Existing view and simulated view of high-speed train from Owens Street at Dolores Street, looking south	3.16-126
Figure 3.16-59 Key viewpoint 26: Existing view and simulated view of high-speed train on Bakersfield South Alternative from Dr. Martin Luther King Jr. Park, looking northeast	3.16-127
Figure 3.16-60 Key viewpoint 19a: Existing view and simulated view of high-speed train on Bakersfield South Alternative from the vicinity of Dr. Martin Luther King Jr. Boulevard, looking west down E. California Avenue	3.16-128
Figure 3.16-61 Key viewpoint 28: Bakersfield Station–Hybrid Alternative from Truxtun Avenue, looking south	3.16-131
Figure 3.16-62 Key viewpoint 29: Existing view and simulated view of Bakersfield Hybrid Alternative from Owens Middle School (King Street at Dolores Street), looking north	3.16-133
Figure 3.16-63 Conceptual HMF layout	3.16-134
Figure 3.16-64 Example of power substation in urban setting, with landscape screening and fence	3.16-145
Figure 3.17-1 Historic properties and historical resources within the architectural APE (17 Sheets)	3.17-66
Figure 3.17-2 Paleontological sensitivity zones	3.17-100
Figure 4-1 HST alternatives and HMF site alternatives	4-4
Figure 4-2 Fresno area: Section 4(f) properties within the project study area	4-14
Figure 4-3 Hanford area: Section 4(f) properties within the project study area	4-15
Figure 4-4 Corcoran area: Section 4(f) and 6(f) properties within the project study area	4-16
Figure 4-5 Wasco-Shafter area: Section 4(f) properties within the project study area	4-17
Figure 4-6 Bakersfield area: Section 4(f) properties within the project study area	4-18
Figure 4-7 Colonel Allensworth State Historic Park	4-35
Figure 4-8 Allensworth Ecological Reserve land acquisition	4-36
Figure 4-9 Hanford area: Hanford West Avoidance Alternative overview	4-50
Figure 4-10 Hanford area: Hanford West Avoidance Alternative details	4-51
Figure 7-1 Preferred Alternative and other HST alternatives	7-2

This page intentionally left blank.